

**THE USE OF SPATIAL ANALYSIS AND PARTICIPATORY APPROACHES IN  
STRATEGIC ENVIRONMENTAL ASSESSMENT (SEA): IDENTIFYING AND  
PREDICTING THE ECOLOGICAL IMPACTS OF DEVELOPMENT ON THE  
KWAZULU – NATAL NORTH COAST OF SOUTH AFRICA**

Ms Fathima Ahmed

**Submitted in partial fulfillment of the Doctor of Philosophy (D. Phil)**

Discipline of Geography  
School of Environmental Sciences  
Faculty of Humanities  
University of KwaZulu-Natal

**Supervisor: Prof Urmilla Bob  
University of KwaZulu-Natal (Westville Campus)**

**Co-supervisor: Prof Fethi Ahmed  
University of KwaZulu-Natal (Westville Campus)**

## **DECLARATION**

Submitted in fulfilment/ partial fulfilment of the requirements for the degree of PhD in Geography in the Graduate Programme in the School of Environmental Sciences, University of KwaZulu-Natal, South Africa.

I declare that this dissertation is my own unaided work. All citations, references and borrowed ideas have been duly acknowledged. I confirm that an external editor was/ was not used and that my Supervisor was informed of the identity and details of my editor. It is being submitted for the degree of PhD in Geography in the Faculty of Humanities, Development and Social Science, University of KwaZulu-Natal, South Africa. None of the present work has been submitted previously for any degree or examination in any other university.

---

Fathima Ahmed

---

Date

## ACKNOWLEDGEMENTS

I thank my parents and sister for their love, constant support and well-wishes.

I owe a special thank you to my supervisor Professor Urmilla Bob, for her constant support, guidance and mentorship. I also thank her for the time and dedication she committed to commenting and critiquing this work. I thank my co-supervisor, Professor Ahmed for his input into this research. His comments were appreciated.

To Michael, I owe a big thank you for all the assistance with the fieldwork and for producing the maps in this thesis. To Suveshnee and Syd, I appreciate the support and assistance with my teaching and administration duties respectively during the past few months. I thank Dr Vadi Moodley for all his comments and suggestions. A special thank you goes to Jyoti who has been a sister and colleague, and who has kept me sane all these months.

I would like to thank all the stakeholders who participated in this research, especially those who gave their time to attend the focus group discussions. Your input has been the essence of this research.

Finally, I would like to thank the National Research Foundation (Thuthuka Grant) for providing the funding for this research and the University of KwaZulu-Natal for their support via the LEAP program, in particular Dr Paddy Ewer.

## ABSTRACT

The high pressures for coastal development, translated as prolific land cover transformation, coupled with the weaknesses of management to protect the environment has led to the gradual deterioration of environmental conditions in many coastal areas. Land use decisions in coastal areas are based on opportunities and constraints affected by both biophysical and socio-economic drivers, and hence present one of the main issues integrating the large debate on sustainable development in coastal zones (Lourenço and Machado, 2007: 1). The aim of this study is to investigate the effectiveness of the integration of spatial analysis and participatory approaches in SEA (particularly its ability to identify and predict ecological impacts) on the KwaZulu-Natal north coast of South Africa. The study adopted a conceptual framework based on landscape ecology, which was underpinned within the overarching political ecology framework. The former underscores the importance of integration, while the latter critiques the institutionalization of environmental concerns, which are characterized by inequalities in terms of social and political power and of how problems are defined, mediated and resolved. Hence this conceptual framework was considered appropriate to assess the strategic environmental issues pertaining to the coastal zone on the KwaZulu-Natal north coast. The researcher used participatory methods, primarily focus group discussions (which included venn diagramming, ranking exercises and participatory mapping) which were triangulated with both quantitative and qualitative methods as part of an integrated impact assessment. These relate to the use of semi-structured questionnaires which were administered to a purposive sample of six key stakeholder interest groups within the study area. A spatial GIS time series analysis of land use and cover change was employed to determine baseline conditions, changes in the state of key ecosystems, key development drivers and emerging threats. Additionally, a policy and institutional review was undertaken. The analysis revealed that major natural land cover classes are in decline in the study area, within a time period of less than 10 years. The most sensitive ecosystems were found to be grasslands (-19.99%), coastal forest (-40%), wetlands (-37.49%) and secondary dunes (-21.44%). Furthermore, agriculture and forestry are also indicating severe declines. The reasons attributed to this transformation of land cover are increasingly being linked with economic motives such as individual private land-owner dynamics, tourism growth and development in the area. Furthermore, the policy agendas are clearly economically motivated. These losses signify the cumulative decline in ecosystem goods and services, and could undermine pose risks to the society that relies on them either directly or indirectly. One of the main considerations in this research endeavor was to formulate a Strategic Environmental Assessment (SEA) Framework to inform future ICZM in the study area. SEA is planning with a long-term perspective, with a focus on a spatial rather than a project level, an element that is clearly lacking in the current development scenario of this coastline. It is critical that the SEA Framework advocated in this study include a range of variables that will permit short-term, medium-term and long-term monitoring and evaluation aimed at ensuring sustainable planning in the area.

## TABLE OF CONTENTS

Declaration	ii
Acknowledgements	iii
Abstract	iv
List of acronyms	xiv

### **Chapter One: Introduction**

1.1 Preamble	1
1.2 Rationale for the study	2
1.2.1 The South African coastal zone context	8
1.2.2 The KwaZulu-Natal coastal zone context	10
1.3 Aim of the study	14
1.4 Hypothesis	15
1.5 Objectives	15
1.6 Chapter sequence	16
1.7 Conclusion	16

### **Chapter Two: Conceptual Framework**

2.1 Introduction	18
2.2 The political ecology approach	20
2.3 Political ecology in environmental discourses	23
2.3.1 Political ecology of conservation	27
2.4 Landscape ecology	29
2.5 Interdisciplinary studies and landscape ecology	35
2.6 Integrated coastal zone management (ICZM) as an environmental discourse	36
2.7 Conclusion	37

### **Chapter Three: Literature Review**

3.1 Introduction	39
3.2 Coastal Zone: An interlink between systems	40
3.2.1 Natural coastal systems	41

3.2.2 Human coastal systems	43
3.3 Coastal ecology	47
3.4 Ecological economics and the coast	49
3.4.1 Value of coastal ecosystem goods and services	53
3.4.2 Ecosystems under pressure	57
3.5. Drivers of biodiversity and ecosystem change in the coastal zone	58
3.5.1 Direct drivers	60
3.5.2 Indirect drivers	61
3.6 Globalization and economic activity in coastal zones	61
3. 7 Global climate change and coastal zones	64
3.7.1 Sea Level rise and erosion	68
3.7.2 Adapting to sea level rise	70
3. 8 Coastal landscape change	72
3.8.1 Loss of agricultural land	74
3.8.2. Landscape fragmentation in the coastal zone	75
3.9 Coastal and marine tourism	78
3.9.1 Geographic zone of coastal tourism impacts	81
3.9.2 Tourism land use change and impacts	82
3.9.2.1 Beach loss in coastal areas	83
3.9.2.2 Water stresses in the coastal zone	84
3.9.3 Marine ecotourism	86
3.9.3.1 Eco-developments	87
3. 9.4. Marine tourism management	89
3.10 Sustainable development in the coastal zone	89
3.10.1 The need for integrated coastal zone management (ICZM)	93
3.11. Integrated Coastal Zone Management (ICZM)	96
3.11.1 The ICZM process	98
3.11.2 Strategies in the coastal zone	102
3.11.3 Critical Overview of Capacities for ICZM	104
3.12 Strategic Environmental Assessment (SEA)	106
3.12.1 ‘Sustainability-led’ in SEA	109

3.12.2 SEA in ICZM	110
3.12.2 Limitations of SEA	112
3.13 Spatial analysis in SEA within the context of coastal zones	114
3.14 Conclusion	117

## **Chapter Four: Coastal Zone Management in South Africa**

4.1. Introduction	118
4.2. The South African coast: A national asset	119
4.3. Socio-economic trends in South Africa's coastal cities	121
4.4. Integrated Environmental Management (IEM) in South Africa	125
4.5 The South African coastal policy process	129
4.5.1 Implementation of CZM 1970s-1980s	131
4.5.2 From bureaucratic control to democratic engagement with governance	132
4.5.3. The CMPP: A process of 'policy dialogue'	133
4.6 South African ICM policy and legislation	137
4.7 National Environmental Management: Integrated Coastal Management Act (NEMICMA)	139
4.8. Coastal tourism legislation	143
4.9 Conclusion	144

## **Chapter Five: Study Area and Methodology**

5.1 Introduction	145
5.2 Study area	147
5. 2.1 Climate, soils and hydrology	152
5.2.2 Biodiversity	153
5.2.3 Coastal risk	155
5.2.4 Development trajectory	156
5.2.5 Tourism	158
5.2.6 Pressures on the coastal environment	160
5.3 Research methods employed in the study	161

5.4 Quantitative and qualitative methods	163
5.5 Participatory research	164
5.5.1 Policy and institutional review	164
5.5.2 Focus group discussions (Appendix II and Appendix III)	166
5.5.3 Institutional or venn diagrams	167
5.5.4 Ranking exercises	167
5.5.5 Social landscape/ participatory mapping	168
5.5.6 Key Informant Interviews	168
5.6 Time series change analysis	169
5.6.1 Classification	171
5.7 Data Analysis	172
5.8 Conclusion	173

## **Chapter Six: Data Analysis and Discussion**

6.1 Introduction	174
6.2 Population in the study area	175
6.3 Time series of land use and cover	177
6.4 Threats to the biodiversity of the area	183
6.4.1 State of key ecosystems	184
6.4.2. Recommendations for biodiversity protection	190
6.5 Key drivers of change	193
6.5.1 Future development pressure points	198
6.5.2 Socio-economic and environmental impacts of general development	201
6.6 A critique of management tools and strategies for development	206
6.7 Conflicts relating to land use and development	208
6.8 Tourism	210
6.8.2 Tourism and the environment	213
6.9 Institutional decision-making in the study area	216
6.10 Policy review	222
6.10.1 Critique of Identified Policies	225

6.10.1.1 Accelerated and Shared Growth Initiative (ASGISA)	225
6.10.1.2 Provincial Economic Development Strategy (PEDS)	227
6.10.1.3 National Spatial Biodiversity Assessment (NSBA)	228
6.10.1.4 Integrated Development Plans and Land Use Management Systems	230
6.10.1.5. Overall assessment	231
6.11. Conclusion	233

## **Chapter Seven: Summary, Conclusion and Recommendations**

7.1 Introduction	234
7.2 Summary of Key Findings	234
7.3. SEA Framework	242
7.4 Recommendations	245
7.4.1 Institutional structures	245
7.4.2 Tourism	246
7.4.3 Climate change and policy development	247
7.4.4 Key threats	247
7.4.5 Future research	248
7.5 Concluding Remarks	250
<b>REFERENCES</b>	<b>252</b>

<b>APPENDICIES</b>	<b>277</b>
Appendix I: Standardized South African land use/cover classification	278
Appendix II: Focus Group Schedule (Interested and Affected Parties)	284
Appendix III: Focus Group Schedule (Academic stakeholders)	288
Appendix IV: Key Stakeholder Interview (Coastal Management Stakeholders)	291
Appendix V: Key Stakeholder Interview (Tourism stakeholders)	294
Appendix VI: Key Stakeholder Interview (Environmental stakeholders)	297
Appendix VII: Key Stakeholder Interview (Developers)	300

## LIST OF FIGURES

Figure 1.1 Rate of transformation 1995 and 2000 on the KwaZulu-Natal Coastline	12
Figure 3.1 Population density (people per km <sup>2</sup> ) trends in coastal zones by continent	44
Figure 3.2 Ecosystem Services and their Links to Human Well-being	54
Figure 3.3 Drivers of Ecosystem Change	60
Figure 3.4 Changes in temperature, sea level rise and Northern Hemisphere snow cover	65
Figure 3.5 Natural disasters in Africa	67
Figure 3.6 The ICZM policy cycle	99
Figure 3.7 Different approaches to biodiversity assessment and their relationship to assorted physical scales and ecological levels	108
Figure 4.1 The province of KwaZulu-Natal, within the South African coast	120
Figure 4.2 The South African coastal policy formulation process	130
Figure 4.3 Four orders of coastal governance outcomes	131
Figure 5.1 Map of the study area	147
Figure 5.2 Local coastal municipalities in the study area KwaZulu-Natal	149
Figure 5.3 Dube Trade Port (DTP) site	151
Figure 5.4 Coastal risks – Umhlanga to Tongaat	156
Figure 5.5 Provincial priority corridors for KwaZulu-Natal	157
Figure 5.6 Tourism’s contribution to GDP in South Africa: 1998-2002	159
Figure 5.7 Domestic tourism visitation destinations in 2007	160
Figure 6.1 Time series of land use and cover change 200-2008	179
Figure 6.2 Participatory mapping of biodiversity ‘hotspots’ and resilient areas	191
Figure 6.3 Participatory map of key drivers of land use and cover change	197
Figure 6.4 Participatory map of future investment areas	199
Figure 6.5 Water supply areas in KwaZulu-Natal coastal region	205
Figure 6.6 Venn diagram – focus group 1: Institutional mapping	218

Figure 6.7 Venn diagram – focus group 2: Institutional mapping	219
Figure 7.1 Land use and cover changes 2000-2008	236

### **LIST OF TABLES**

Table 2.1: Lattuca’s continuum of interdisciplinary research	35
Table 3.1 Advantages and drawbacks of different adaptation options to cope with the rise in sea level	71
Table 5.1 Key land use indicators and methods	146
Table 5.2 Status of fauna in the Maputaland/ Pondoland Center of Endemism	154
Table 5.3 Stakeholders contacted and level of response	162
Table 5.4 Classification hierarchy	170
Table 6.1 Population figures for the study area	176
Table 6.2 Change in land use and cover classes in ha (2000-2008)	180
Table 6.3 Status of key ecosystems	185
Table 6.4 Ranking Matrix - Key drivers of land use change (focus group 1)	194
Table 6.5 Ranking Matrix - Key drivers of land use change (focus group 2)	195
Table 6.6 Risk assessment of land use-ecology relationships	213
Table 6.7 Ranking matrix criteria for institutional strength (academic Stakeholders)	217
Table 6.8 Multi-criteria for policy analysis	223
Table 6.9 Assessment for policy pertaining to the coastal zone	229
Table 7.1: SEA Indicator Framework	243

## LIST OF PLATES

Plate 3.1 Storm damage of the KwaZulu-Natal coastline, South Africa in 2007	66
Plate 3.2 Tourism related development on eroding cliffs at Albufeira on the Algarve coast of Portugal	84
Plate 6.1 Water feature in an eco-estate in the study area	181
Plate 6.2 Golf course on an eco-estate in the study area	182
Plate 6.3 Wetlands as refuge for swallows in the vicinity of the DTP area at Mt Moreland	189

## List of Acronyms

ABSA	Amalgamated Bank of South Africa
ANC	African National Congress
ASGISA	Accelerated and Shared Growth Initiative of South Africa
B&B	Bed and Breakfast
CBO	Community-based Organization
CMO	Coastal Management Objectives
CMP	Coastal Management Plan
CMPP	Coastal Management Policy Program
CMU	Coastal Management Unit
CSIR	Council for Scientific and Industrial Research
CZM	Coastal Zone Management
DAEA	Department of Agriculture and Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
DFA	Development Facilitation Act
DME	Department of Minerals and Energy
DTP	Dube Trade Port
DWAF	Department of Water Affairs and Forestry
ECA	Environmental Conservation Act
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EU	European Union
FAO	Food and Agricultural Organization
FDI	Foreign Direct Investment
FIFA	Federation Internationale de Football
GAGM	Global Anti-Golf Movement
GCP	Ground Control Points
GDP	Gross Domestic Product
GEAR	Growth, Employment and Redistribution Strategy
GEF	Global Environment Facility
GESAMP	Group of Experts on the Scientific Aspects of Marine Environmental Protection
GGP	Gross Geographic Product
GIS	Geographic Information Systems
GIWA	Global International Waters Assessment
GOOS	Global Ocean Observing System
GPA	Global Program of Action
GPS	Global Positioning System
GTOS	Global Terrestrial Observing System
I&AP	Interested and Affected Parties
ICAM	Integrated Coastal Area Management
ICZM	Integrated Coastal Zone Management
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IFP	Inkatha Freedom Party
INR	Institute for Natural Resources

IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
KSIA	King Shaka International Airport
LED	Local Economic Development
LOICZ	Land-Ocean Interactions in the Coastal Zone
LUMS	Land Use Management System
MEA	Millennium Ecosystem Assessment
MSA	Municipal Systems Act\
NBSAP	National Biodiversity Strategy and Action Plan
NEMA	National Environmental Management Act
NEMICMA	National Environmental Management: Integrated Coastal Management Act
NEPA	National Environmental Policy Act
NSBA	National Spatial Biodiversity Assessment
NSDP	National Spatial Development Perspective
NGO	Non-governmental Organization
OECD	Organization for Economic Cooperation and Development
PC	Priority Corridors
PEDS	Provincial Economic Development Strategy
ROD	Record of Decision
RS	Remote Sensing
SAT	South African Tourism
SC	Spatial Corridors
SDI	Spatial Development Initiative
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
Stats SA	Statistics South Africa
TKZN	Tourism KwaZulu-Natal
UGB	Urban Growth Boundary
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNESCO	United Nations Education Scientific and Cultural Organization
USAID	United States Agency for International Development
USGS	United States Geological Survey
WESSA	Wildlife and Environmental Society of South Africa
WSSD	World Summit on Sustainable Development
WWF	World Wildlife Fund

# CHAPTER 1

## Introduction

### 1.1. Preamble

Coastal zones are of particular importance, from an environmental, social and economic point of view. Coastal zones have witnessed a rapid growth through the expansion of urbanization, industrialization, fisheries, forestry and agriculture, tourism and other land-based activities. This growth has led to increasing pressures on and intensifying conflicts over scarce coastal resources on both the land and marine environments (Banica *et al.*, 2003: 11). Administration and policy for coastal zone management, which will promote sustainable development, is therefore necessary. Integrated Coastal Zone Management (ICZM) in South Africa is increasingly becoming recognized as an appropriate approach towards this aim. This chapter introduces the significant issues in the coastal zones from a global to local perspective (that is the South African perspective to the provincial KwaZulu-Natal perspective). A brief review of management tools used in assessing developments on coastal zones and policy and the benefits of integrating coastal decision-making with spatial techniques is given, thus providing a rationale for undertaking this study. Furthermore, this chapter includes the aim of the study, the hypotheses, the objectives (and a brief methodology to each objective). This is followed by a chapter sequence, outlining the major themes of each chapter. The chapter concludes by summing up the key themes and points of discussion arising from the chapter.

It is important to provide an integrated conceptual and methodological framework to understand biodiversity issues, and conflicts in particular. This thesis contributes to knowledge production pertaining to coastal zone management by specifically adopting a multi-conceptual framework and highlights on the importance of integrating environmental aspects embedded in spatial analyzes. In terms of the latter, this study focuses on social spatial data by adopting participatory approaches from the social sciences and time series analysis using remote sensing and GIS. Specifically, the time

series analysis is undertaken to examine the key land use drivers in the area under study and the extent to which land use changes are occurring. The resultant implications are discussed in relation to findings derived from the social data and the review of strategic policies. This approach underpins the key challenges facing effective coastal zone management.

White *et al* (2009) assert that often studies focus on either the ecological, economic or social aspect which is inadequate. Furthermore, studies often adopt a qualitative or quantitative approach. In terms of the latter, surveys and spatial analysis using remote sensing and/ or GIS are rarely used together. This study undertakes a holistic and unique approach, using several methodologies including qualitative methods (Key Informant Interviews, focus group discussions, participatory GIS), quantitative methods (surveys, remote sensing and GIS) and policy reviews. Thus, this study also contributes to knowledge in relation to integration of multiple methods. This is done specifically because quantitative data/information does not provide the underlying qualitative motivations and perceptions related to environmental trends, changes and impacts. Understanding social and institutional aspects are critical when focusing on management and governance issues. Thus, social scientific viewpoints and approaches are required as this study demonstrates. To the best of the researcher's knowledge, no study in South Africa utilizing the conceptual and methodological approaches adopted has been used to undertake an assessment of coastal area management and develop an SEA Framework for the future planning and management of the coastal zone.

## **1.2. Rationale for the study**

No single prescribed definition of the coastal zone exists and various definitions of it have been proposed owing to various contexts and the different goals and purposes attributed to it (Gremmenas, 2005: 8). For instance, Creel (3003: 2) defines the coastal zone environment according to three interrelated functions: coastal zone protection, provision of ecological services and economic utilization. When considering coastal protection, most definitions of coastal zones include the area within 60 to 200 km of the

shoreline which includes features such as floodplains, mangroves, beaches, dunes, and coral reefs amongst others (Creel, 2003: 2), which buffer or reduce the impacts of environmental disturbances such as storm surges and extreme events (Galaz *et al.*, 2008: 1). Ecological functions are underpinned by coastal ecosystem services such as water purification, flood and erosion control, waste detoxification, climate regulation, and nursery areas for a variety of organisms (Galaz *et al.*, 2008: 1). Furthermore, coastal zones are important economic zones (supporting fisheries, industry, recreation and tourism, and residence) which “sustain livelihoods through flows of income derived from the *in situ* utilization of natural coastal capital and through global trading networks” (Turner, 2004: 2).

Although exact numbers are debatable due to these varying definitional and jurisdictional delineations around what constitutes a coastal zone, Turner (2004: 1) states that around 60% of the world’s population live within 100 km of the shoreline, and that this figure could rise to three quarters by the year 2020. Worldwide, coastal zones represent approximately 10% of the earth’s surface, thereby making them particularly vulnerable to pressures from population growth, pollution, habitat destruction, resource exploitation and multiple resource use conflicts (Shi *et al.*, 2001: 412).

According to the United Nations Environment Program (UNEP) (2001a: 2), coastal areas worldwide are experiencing worrying trends in conflicts over access to the coastline (prohibiting public use of coastal resources and/or the shore) and irreconcilable use conflicts. Additionally, privatization of space, long-term goals for conservation compromised by short-term economic interests (for example, the preservation or drainage of wetlands) and the provision of infrastructure (inappropriate or inappropriately sited) to meet the demand for economic development (for example, the expansion of sewage treatment works to meet increasing tourism demands) are identified by UNEP (2001a: 2).

Haag (2002: 9) states that although humans have modified coastal environments for hundreds of years, it was only in the mid-twentieth century that the management of human activities and their impacts on the coastal zone were brought together under the

umbrella term ICZM or Integrated Coastal Area Management (ICAM). ICZM, IZAM and Coastal Zone Management (ICM) are terms used interchangeably in the literature and in this thesis. However, preference is given to the term ICZM. The coastal zone is, as recently touched upon in social, policy and natural resource management agendas, the most important environment from a human perspective (Haag, 2002: 9). Furthermore, the coastal zones present one of the most challenging resource systems for management due to their scale, diversity, complexity and dynamic nature. It is owing to these reasons that ICZM initiatives currently advocate systematic and integrated approaches to management (Banica *et al.*, 2003: 26).

As there is no single definition of the ‘coastal zone’, so are there variations in approaches to its management. However, the common theme traversing definitions of ICZM initiatives is that of sustainability. According to the UNEP (2001a: 5), for example, “ICZM is a continuous, proactive and adaptive process of resource management for environmentally sustainable development in coastal areas”. Furthermore, ICZM is often the “expressions of anthropogenic change to coastal ecosystems brought on by the intensifying pressures from human activities” (Olsen and Christie, 2000: 7), which are expressed as the degradation of coastal habitats and the resulting loss of biological diversity; declining near shore and freshwater quality; the inappropriate siting of shorefront infrastructure and their subsequent vulnerability to the impacts of erosion or accretion processes and reduced access for traditional users and the public to the shore (Olsen and Christie, 2000: 7).

According to the United Nations Education Scientific and Cultural Organization (UNESCO, 2006: 2), during the past decade, the importance of the coastal zone in the context of national economies of coastal and island states has been widely acknowledged and recognized. Global perspectives on coastal zone management and sustainable development, advocated by Chapter 17 of Agenda 21 (pertaining to the sustainable management of oceans and coasts) mandate all countries with coastlines to take immediate measures to bring about the sustainable use of their coastal and marine resources (UNESCO, 2006: 6). Furthermore, ICZM is central to the implementation of

the Jakarta Mandate on Marine and Coastal Biological Diversity in 1992, the Barbados Action Plan in 1994 as well as to numerous guidelines, principles, agreements, protocols, plans and standards formulated and supported by the United Nations agencies (for example, the United Nations Conference on Environment and Development, UNEP), the World Bank, and more recently the Plan of Implementation for the World Summit on Sustainable Development in 2002 (UNESCO, 2006: 6).

Two important trends contribute to this growing (and evolving) worldwide awareness of the environmental impacts of development activities in coastal zones. One is the steady movement of population over the years into coastal areas which is reflected in 60% of the world's population presently being concentrated within 100 km of the shoreline (Turner, 2004: 1), which is expected to exacerbate with time. Second, is the ecological crisis witnessed through “interrelated global driving pressures such as urbanization, industrial development and mass tourism, coupled with anthropogenically induced climate change which impact on regional and local resource systems with consequent local management problems” (Turner, 2004: 1).

As the negative elements of change in coastal areas draw more public attention, and sustainable development becomes a goal for many coastal areas, the continuing coastal change associated with accelerated growth and development becomes a critical issue. There has been considerable development in both the acceptance of the need to manage human-environment interactions and the tools available to achieve such management (Reid, 2004: 4). Amongst such assessment tools are Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA), collectively known as Environmental Assessment. These procedures are designed to ensure that the environmental implications of certain actions are considered earlier on in decision-making to mitigate potential negative environmental impacts and enhance positive impacts. SEAs generally apply to high level governmental plans and programs, and allow for the identification, comparison and adoption of feasible options or alternatives, while EIAs apply to individual development projects (Reid, 2004: 4).

In the past two decades, however, there has been a growing disillusionment regarding the capacity of project EIAs to assist in sound environmental decision-making (Partidario, 2000: 649, Xiuzhen *et al.*, 2002: 102). EIA has been criticized for its tendency to be reactionary (examining already selected and often already designed undertakings), narrow (failing to address cumulative impacts, long-term impacts and strategic processes), and poorly integrated into broader political and economic processes (Stinchcombe and Gibson, 2001: 346; Kuyler, 2006: 27). In this light, “SEA has also been elaborated and sometimes applied as a response to the much larger failings that threaten ecological integrity and deepen socio-economic inequities nationally and globally” (Stinchcombe and Gibson, 2001: 346). Thus, the implementation of SEA in the coastal zone can ensure that ICZM fully integrates environmental considerations from the stage of policy-making to the streamlining of individual projects, which, it is envisioned, will progress towards sustainable development.

A distinct characteristic of SEA is that it deals with wider, less detailed, spatial scales than project EIA (Brown and Therival, 2000: 187), and hence provides relevant data to decision-makers at the appropriate scale and level of detail (Retief *et al.*, 2007: 49). In coastal zones, management is expected to deal with land use and access while integrating concerns about environmental sustainability and the linkages between the local coastal system and larger scale biophysical systems (Degnbol *et al.*, 2003: 1). Thus, SEA can be considered an appropriate tool to aid ICZM.

It is increasingly being recognized that spatial information is one of the most critical elements underpinning decision-making (Klemas, 2001: 49), and this certainly pertains to its inclusion in SEA. According to Nagendra (2000: 2378), tools for spatial representation and manipulation commonly make use of geographic information systems (GIS) and remote sensing (RS) techniques. A significant benefit of RS and GIS techniques is their ability to collect, structure, and analyze coastal management relevant spatial data, for example, “landscape level environmental indicators extracted from satellite imagery can be combined in a GIS with ancillary data layers to provide quantitative estimates of coastal habitat conditions and trends” (Klemas, 2001: 47). These are quite useful for

decision-makers during strategic and environmental impact assessments, which largely guide coastal development.

Common tools used in both ICZM and environmental assessments are remote sensing and Geographic Information Systems (GIS) which are needed to integrate a variety of data and facilitate an understanding of the complex interactions in the coastal zone (Haag, 2002: 16). Developing long-term conservation strategies needs effective consideration of coastal vegetation types on a large-scale, for example ecosystems or landscape levels. The combination of spatial analysis with SEA presents a unique opportunity to consider coastal land use planning in conjunction with applicable policy to result in quality decision-making in order to achieve the balanced sustainable development and conservation ideal.

Several authors (Luz, 2000; Wheeldon and Faubert, 2009) argue that it is imperative that landscape planning activities take not only the physical facts of an area into consideration, but also deal with the social situation of the people whom the planning affects; that is through collaboration with local actors and stakeholders. According to Hirsch (1992 cited in Luz, 2000: 157), the implementation of ecological concepts stems from the social rather than ecological systems, “yet this notion has been expressed in neither performance guidelines nor the regulations on fees for landscape planning, although the democratic strength of user-oriented planning is frequently stressed”. Nohl (1997 cited in Luz, 2000: 157) underline the importance of integrating of social and emotional factors with landscape ecology and landscape planning, to strengthen input into, acceptance of and to provide practical solutions to plans at a local level.

While quantitative aspects in landscape ecology should be encouraged (Luz, 2000: 157), “qualitative research is ideally suited to the generation of new theories grounded in participants’ knowledge”. Wheeldon and Faubert (2009: 72) suggest that the use of participant-generated maps in multistage data collection allows for “middle ground in grounded theory”, where instead of looking to the researcher to search for codes,

concepts and categories within the data, maps allow for the identification of concepts and connections based on how the participant frames their experience. Furthermore, subsequent data collection strategies can allow for the participant-generated framework to be tested, explored and further explained and defined through interviews and/or focus groups (Wheeldon and Faubert, 2009: 72). This approach was adopted in this study.

### ***1.2.1 The South African coastal zone context***

South Africa's coastline extends approximately 3000 km stretching from the border of Namibia on the west, coast to the border with Mozambique on the east coast (Glavovic, 2000: 5). Its character is shaped by its location at the tip of Africa where it is influenced by three distinct ocean systems, which are the Atlantic, Indian and Southern Oceans (Glavovic, 2000: 33). Thus the South African coast is extremely diverse, in terms of its climatic patterns, geological, hydrological and biological characteristics (both aquatic and terrestrial) (Glavovic, 2000: 33), as well as its economic, human settlement and institutional settings (Department of Environmental Affairs and Tourism - DEAT, 2000a: 18). In addition, the value of the relationship between society and economy, and ecosystems reflect that the direct benefits derived from coastal ecosystems annually contribute approximately 35% to the Gross Domestic Product (GDP) (R168 bn) of the South African economy (DEAT, 2000a: 120).

In South Africa, the key pressure points impacting on coastal environments are the implications resulting from the abolishment of apartheid, as well as an increase in (international) tourism (Haag, 2002: 11). Apartheid policies were primarily responsible for the social, economic and environmental inequalities that characterize South Africa today. Furthermore, development is often aimed at attempting to redress these inequalities, focusing almost exclusively on social and economic aspects with very little consideration for the environment. A key driver is also tourism which is one of the main economic sectors in South Africa. Coastal issues in South Africa are not separate from the overall context of development taking place at the national level. According to Glavovic and Boonzaier (2007: 1), confronting poverty and social equity are arguably the

most challenging issues facing the government, and South Africa's coast has a significant role in meeting basic needs and improving the well-being of coastal communities, where 40% of the country's population is located (DEAT, 2006a: 173). A situation analysis conducted by the United Nations Development Program (UNDP), reveals the following on South Africa: persistently high unemployment (29%) rate, poverty (34% subsisting on less than \$2 per day), large wealth disparities (Gini-Coefficient of 0.59), high HIV/AIDS infection rates, a dual formal/ informal economy, a low skills base and wide urban/ rural disparities (UNDP, 2006: 2). Given the value of the coast, these areas offer development opportunities (primarily port facilities, roads and housing) which may promote local and regional economic development, thus increasing the pressure to develop (DEAT, 2006a: 170).

In recent years coastal development is being driven by the appeal of living at the coast coupled with personal wealth, people retiring to the coast, an increase in coastal holiday homes and resorts, and demand for recreation and tourism associated with the coast, as well as net in-migration of people seeking jobs (DEAT, 2006a: 173). Furthermore, government incentives applicable to the whole country, in the form of coastally orientated development policies such as the Growth, Employment and Redistribution Strategy (GEAR), Accelerated and Shared Growth Initiative of South Africa (ASGISA), Spatial Development Initiatives (SDIs) and economic corridors are encouraging this development in coastal areas (UNDP, 2006: 2).

The development of coastal areas has been particularly profitable in terms of the residential sector, especially golf estates (DEAT, 2006a: 173). According to a report by the Amalgamated Bank of South Africa (ABSA) (2007: 5), "the demand for coastal property is expected to continue to outstrip supply, so property prices in these areas are forecast to rise further in future, causing coastal property to become even more exclusive and less affordable". This escalation in residential development is further compounded by simultaneous advances in other sectors which are seen to boost the country's economy on a national scale, such as the heavy mineral mining sector which has focused solely on the coastal environment (Celliers and MacKay, 2005: 1).

While there appears to be an economic boom occurring within the coastal zones of South Africa, the natural foundation of the coast, that is, fauna and flora, dune systems, wetlands, estuaries, and water resources; as well as the structure and functioning of these systems are under threat of being severely damaged, polluted or totally wiped out as a result of increasing pressures from the demands of development (ABSA, 2007: 5; Celliers and MacKay, 2005: 1; Tourism KwaZulu-Natal (TKZN), 2005a: 3). Given that this natural foundation is responsible for the healthy functioning of the coastal zone (in terms of protection, ecology and utilization), the ever-growing demands being placed on increasingly degraded ecosystems seriously diminishes the prospects for sustainable development. Decision-making along the South African coastline thus reflects that activities which generate short-term financial gain far outweigh the need for a rational approach that considers long-term shared societal benefits (Celliers and MacKay, 2005: 1). These potential (and actual) conflicts in the South African coastal zone call for dedicated coastal zone management.

In South Africa, the recent National Environmental Management: Integrated Coastal Management Act of 2008 has come into effect to establish a system of integrated coastal and estuarine management, including setting policies, and clarifying government roles to ensure that development and use of coastal resources is socially and economically justifiable and ecologically sustainable (DEAT, 2008: 2). Furthermore, the Act is a legal mechanism which gives effect to South Africa's international responsibilities in relation to coastal issues (DEAT, 2008: 2).

### ***1.2.2 The KwaZulu-Natal coastal zone***

KwaZulu-Natal's approximately 600 km coastline falls within the Maputaland-Pondoland Centre of endemism (see Figure 1.1) and is thus considered internationally important from a biodiversity perspective (Goodman, 2005). The inshore coastal area boasts a diversity of both rocky and sandy shores, estuaries and mangroves which provide unique habitats for a range of terrestrial and aquatic organisms. Landward habitats include dunes and coastal forests, wetlands and grasslands which form the terrestrial landscape of the

coastline. Many of these areas are incorporated into, or are in themselves, protected areas (Department of Agriculture and Environmental Affairs - DAEA, 2004: 1865), such the iSimangaliso Wetland Park, which is a renowned world heritage site. The province consists of 7.7% of the land area of the country of South Africa and contains about 21% of the population of the country (approximately 9.9 million people in 2006) (TKZN, 2007: 1). The majority of this population is concentrated within the coastal zone.

In terms of the built environment, KwaZulu-Natal's emergence as the focal point of industrial development in sub-Saharan Africa can be attributed to the availability of natural resources and its well developed rail, road, port and other infrastructure (Exclusive Properties ZA, 2009: 1). The study area, strategically located between the two major ports (Durban and Richards Bay) is a major focal point for the crowding in of investment, especially industry and job creation as well as tourism and property development (DAEA, 2004: 1865). Another major boost to the KwaZulu-Natal economy is the Spatial Development Initiatives (SDI) in the region, especially the Lubombo SDI (tourism development in South Africa, Mozambique and Swaziland), as well provincial priority economic corridors (Exclusive Properties ZA, 2009: 1).

While KwaZulu-Natal is clearly emerging as an important economic hub in the country with many developments in the pipeline, the rapid urbanization of its coastline is occurring within a knowledge vacuum of the potential cumulative and long-term impacts of such large-scale transformation (Celliers and MacKay, 2005: 1). According to Goodman (2005), “there are grave concerns for the future of coastal biodiversity, ecological processes and the free goods and services which accrue to human-kind from this environment”. Furthermore, availability of water in the metropolitan coastal areas of KwaZulu-Natal, as highlighted by the Department of Water Affairs and Forestry (DWAFF, 2008: 6) is becoming a crucial issue with the balance between the water needs (requirements) of the province in a position to outstrip availability.

Thematic maps (TKZN, 2005: 1) provides an overview of both the extent and rate of the transformation of the KwaZulu-Natal coastline (Figure 1.1), from ‘endangered’

vegetation types to ‘critically endangered’ vegetation, as a result of development pressures within a five year period (1995 to 2000). These maps paint a bleak picture when considering the quantity and quality of the vegetation types remaining in the years since 2000, and the ecological implications thereof. Furthermore, Celliers and MacKay (2005: 1) emphasize that some ecosystem types (for example, estuaries and coastal vegetation) facing pressure from this transformation may have national significance which is entrenched in both national and international environmental legislation, and this is largely ignored in the development trajectory.

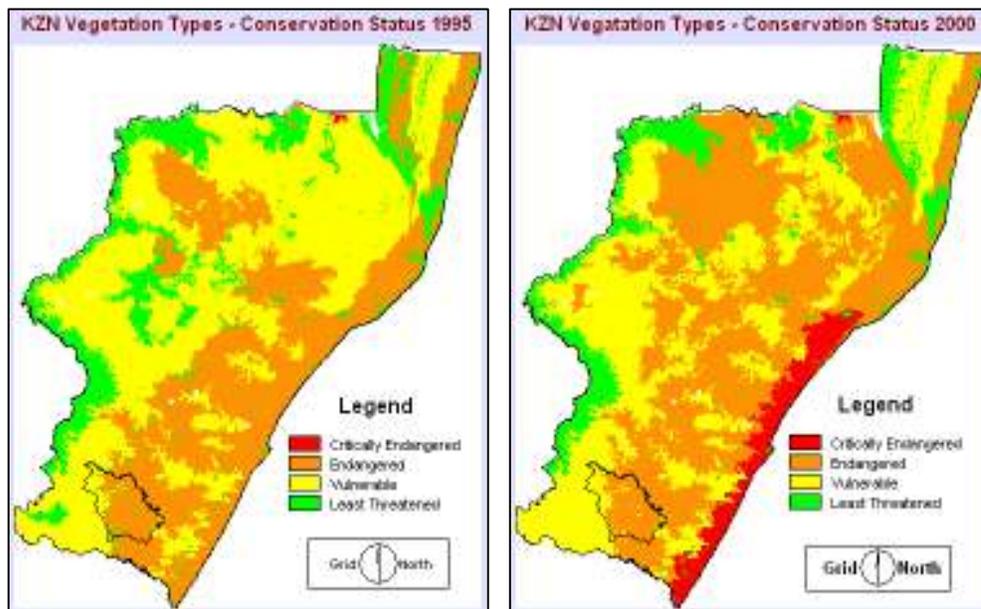


Figure 1.1: Rate of transformation 1995 and 2000 on the KwaZulu-Natal coastline (TKZN, 2005: 3)

Large-scale environmental processes such as those transforming the KwaZulu-Natal coastal zone cannot be addressed on a strictly local level. The maintenance of coastal ecological and physical processes requires the recognition of the integrated nature of the terrestrial coastal environment and the marine coastal environment if sustainable management of the coastline is to be achieved (KwaDukuza Coastal Management, 2008:

3). This means there is a need to link scales both in terms of physical and biological processes and those in terms of the institutions responsible for management decisions and their implementation (Degnbol *et al.*, 2003: 1).

Poor coordination among government departments and weak integrated management capacity has greatly hampered sustainability of the KwaZulu-Natal coastal zone (Ahmed, 2005: 126). These weaknesses relate to overlapping jurisdiction over coastal resources, conflicts over resource use, inadequate coastal information and poor involvement of stakeholders, suggesting that coastal zone management on the KwaZulu-Natal coastline is still largely sectoral (Ahmed, 2005: 142). The need for integration of activities between the various government departments and other role-players remains urgent. According to Govender (2004: 5), the different demands on the KwaZulu-Natal coast highlights the need to balance these demands in a sustainable manner by realizing the various opportunities presented by the coast in terms of employment, tourism, economic spin-offs and environmental aspects.

Furthermore, according to TKZN (2003: 1), “the approach towards environmental assessments of individual development projects (via EIAs), or of an area on the KwaZulu-Natal coastline, has been a continuous and complex process”. This complexity is driven by two key factors:

- There are few effective practices and procedures in place to guide planners towards sustainable development, for example, no biodiversity assets management plans for large-scale ‘green-fields’ development and hence every piece of untransformed land earmarked for development has to be rigorously challenged during the EIA processes (TKZN, 2005a: 2; Van der Wateren *et al.*, 2006: 3; TKZN, 2007: 7). Furthermore, cumulative impacts of a proposed development at a site and landscape level are not considered in the EIA process, and each development proposal is assessed on an individual and *ad hoc* basis (TKZN, 2005a: 2); and
- There is little environmental information available to inform planning decisions, for example, municipalities lack both the means and criteria to assess the function

or usefulness of any particular land unit in terms of its use for development or conservation (Van der Wateren *et al.*, 2006: 2).

Furthermore, there is a lack of mainstreaming and integration of biodiversity issues into sectoral and cross-sectoral programs and plans of political, social and economic policies at a broader, strategic level (Kuyler, 2006: 4), which may be beyond the physical scope of EIA. In this interaction it is important to address the challenge of linking economic growth and poverty eradication to large-scale natural resource utilization and the wide-scale, cumulative negative impacts on the environment.

What has been established thus far is the notion that EIA is limited in scope to consider the implications of wider pressures for development of the KwaZulu-Natal coastline and overcoming these barriers may be a matter of changing the approach, and an alternative may be found in the adoption of SEA (Haag, 2002: 12). As mentioned earlier, landscape level assessments become particularly important as we shift to larger temporal, spatial, and organizational scales in order to study and compare the cumulative effects of coastal ecosystem degradation over entire landscapes and regions (Klemas, 2001: 49).

Based on the above discussion, the aim and objectives of the study are presented and discussed below.

### **1.3 Aim of the study**

The aim of this study is to investigate the effectiveness of the integration of spatial analysis and participatory approaches in SEA (particularly its ability to identify and predict ecological impacts) on the KwaZulu-Natal north coast of South Africa.

## 1.4 Hypothesis

This study tests the following hypotheses:

- SEA which is properly integrated and informed with spatial data can assist in contributing to sustainability by meeting regulations and recommendations on biodiversity and sustainable development; and
- Spatial analysis can inform good governance that contributes to sustainable development.

## 1.5 Objectives

The study has the following objectives:

(a) To determine the biodiversity patterns in the landscape of the study area.

This objective focuses on choosing appropriate boundary delineations for the study and the appropriate scale of enquiry. Thereafter, it is important to determine the overview of landscape spatially in terms of natural (vegetation types and important ecosystems) and built-up areas (requiring an appropriate classification system of land use and cover classes). In order to elicit meaningful comparisons and changes in the landscape, a time series change analysis is undertaken. To assess the various ecosystems (including biodiversity ‘hotspots’) and possible emerging threats requires coastal stakeholder input into the information gathering process (key informant interviews and focus group methods were undertaken). This objective also identified any likely data gaps which could influence recommendations.

(b) To determine locations of possible future ecological pressures.

This objective determines sites for fine-scale observation for inference purposes. It includes highlighting the areas which are emerging as either sustainable or unsustainable (depending on defined sustainability variables and indicators). This is done in order to establish which areas were at potential risk from development activities. Furthermore, the study elicits information on how economic aspects are distributed in space and how

resources are used in order to establish pressures (drivers or triggers) on ecosystems, their state and the appropriate policy and decision-making responses.

(c) To determine how the products generated from the research could assist in informing decision-making.

This objective identifies sensitive locations (hence no-go option for development), and resilient locations for development. Furthermore, this objective aims at generating information that could assist in streamlining project EIA within a SEA Framework in this coastal landscape.

## **1.6 Chapter sequence**

This study is divided into seven chapters. Chapter two provides a theoretical framework for the study, adopting a political ecology perspective and focusing on landscape ecology to understand the complexity of the coastal zone and its management. Chapter three, the literature review focuses on the importance of the coastal zone, especially from an ecology perspective; development and management issues pertaining to coastal zones and the tools and strategies used in managing the coast. Chapter four examines information specifically on coastal zone management in South Africa, drawing on how its management relates to international best practices in coastal zone management. Chapter five provides a background of the case study and research methodologies adopted. Chapter six provides the data analysis of the primary data collected in the study area. The final chapter, Chapter seven presents a summary of the key findings, forwards recommendations emanating from the study and provides a conclusion to this study.

## **1.7 Conclusion**

The coastal zone is a complex area, at the interface of both the marine and terrestrial realms. It is also increasingly catering to the demands placed on it by development activities, which, may yield short-term benefits, and forego significant long-term benefits.

Globally, and in South Africa, there is the growing recognition of the need to balance development and exploitation of resources in the coastal zone with environmental and social needs and the possibility to realize this exists in the adoption of a dedicated ICZM. The common tool to assess the environmental implications of development activities in the coastal zone has traditionally relied on EIA. However, EIA has been criticized for its tendency to be reactionary, narrow and poorly integrated into broader political, social and economic processes (Stinchcombe and Gibson, 2001: 346; Kuyler, 2006: 27).

In KwaZulu-Natal, economic development pressures, accompanied by the lack of integration of biodiversity concerns into land use planning, and lack of government capacity has resulted in extensive fragmentation and transformation of the coastal landscape (TKZN, 2005a: 1). This transformation has been accompanied by the loss of vegetation, habitats and ecological processes. The transformation status of landscapes in KwaZulu-Natal (Kuyler, 2006: 3) indicates the need for the evaluation of impacts of development on the biodiversity at the landscape level so that guidance can be provided to strategic planning decisions that facilitate sustainable development (Kuyler, 2006: 6). To this end, SEA appears to be a more appropriate response to the much larger contexts that threaten ecological integrity and deepen socio-economic inequities nationally and globally (Stinchcombe and Gibson, 2001: 346), and can be considered an appropriate tool to complement ICZM.

It is increasingly being recognized that spatial information at a landscape level is one of the most critical elements underpinning decision-making (Klemas, 2001: 49). The combination of spatial analysis with SEA thus presents a unique opportunity to consider coastal land use planning in conjunction with applicable policy to inform quality decision-making in order to achieve the balanced sustainable development and conservation ideal.

## CHAPTER 2

### Conceptual Framework

#### 2.1 Introduction

Coastal resources are important constituents of the natural foundations of coastal zones, contributing, to national economies and society's development. However, the world's coastal zones also face a myriad of complex problems resulting from the unsustainable exploitation and utilization of these resources. This complexity arises from the "deficiencies and fragmentation that exist in intellectual and institutional analysis of the diverse knowledge of coastal zones, taking cognizance of the peculiarities of the marine-terrestrial interface, addressing the challenges presented by the spatio-temporal scales presented in this environment and the consideration of coastal environmental change" (Trujillo *et al.*, 2003: 2). Landscape ecology is heralded as the science of complexity, which represents a major paradigm shift from fragmentation (parts) to an analysis of integration (wholes), and is hence a suitable framework within which ICZM can be addressed (Naveh, 2000: 8).

Isager (2008: 3) adds another dimension to ICZM which suggests that it is predisposed towards the increased "globalization and institutionalization of environmental concerns, which are characterized by inequalities in terms of social and political power" and of how problems are defined, mediated and resolved. Therefore, the true meaning of current holistic landscape ecology can only be fully comprehended within the broader context of the political ecology approach, which argues that "ecological arguments are never socially neutral anymore than socio-political arguments are ecologically neutral" (Jones, 2006: 46).

This conceptual framework reflects on the different theoretical dimensions used to analyze the complex coastal landscape, such as the political ecology of decision-making in natural resource management, the concept of ICZM as an environmental discourse and

the environmental tools used in assessing development activity as a landscape assessment. It is reasoned that there exists an undeniable dichotomy between the natural science and the social sciences, which has hampered the interdisciplinary syntheses and understandings of the complex ecological relationships that characterize (coastal) landscapes (Simonsson, 2001: 9). However, as the biophysical environment is increasingly becoming dominated by human action, ecological studies cannot obviate the impact of human behavior. Political ecology, therefore, is a powerful framework for integrating natural and social dynamics (Peterson, 2000: 323) prevalent in the coastal zone.

Lester (2005: 460) provides a useful metaphor to describe conceptual frameworks:

*Conceptual frameworks are not constructed of steel girders made of theoretical propositions of practical experiences; instead they are like scaffoldings of wooden planks that take the form of arguments about what is relevant to the study and why ... at a particular point in time.*

Eisenhart (1991: 210 cited in Lester, 2005: 460) specifically describes a conceptual framework as “a skeletal structure of *justification*, rather than a skeletal structure of *explanation*”. Lester (2005: 458) further indicates that using a framework to conceptualize and guide one’s research has four important advantages:

- A framework provides a structure for conceptualizing and designing research studies. More specifically, a research framework guides the nature of the questions asked; the manner in which questions are formulated; the way the concepts, constructs, and processes of the research are defined; and the choice of acceptable research methods;
- There is no data without a framework to make sense of those data. This implies that adopting an appropriate conceptual framework makes it possible to make sense of a set of data;
- A good framework allows us to transcend common sense. A conceptual framework permits a deeper understanding of complex problems; and
- The need for deep understanding, not just ‘for this’ understanding. A research framework assists in the development of deep understanding by providing a

structure for designing research studies, interpreting data resulting from those studies, and drawing conclusions.

The multi-conceptual framework used in this study is in keeping with White *et al.*'s (2009) approach that calls for an integrated conceptual framework to understand biodiversity issues, and conflicts in particular. The authors argue that this is important since concerns and contestations over the natural resource base are embedded in ecological, economic and social dynamics and further assert that often studies focus on one of these aspects which is inadequate. Additionally, the authors also reinforce the importance of social scientific viewpoints. This study emphasizes the importance of an integrated approach and extends social science contributions to incorporate spatial dimensions.

## **2.2 The political ecology approach**

Muldavin (2008: 687) asserts that political ecology is experiencing a renaissance similar to the rediscovering of the importance of place in Geography and he states: "...this critical approach to the human-environment dialectic provides unique theoretical, methodological, and practical insights for unraveling the complexities of this contentious nexus". Rocheleau (2008: 716) indicates that "political ecology is rooted in a combination of critical perspectives and the hard won insights distilled from fieldwork". Forsyth (2008: 757) argues that political ecology has drawn from Marxian or structuralist analysis of environmental and social changes to integrate more locally-determined, discursive and participatory approaches to environmental crisis and social vulnerability, often embedded within the theoretical framework of post-structuralism. Forsyth (2008: 758) states that this approach focuses on two key questions: "How do we understand environmental crisis? And how do we identify social vulnerability?" Forsyth (2008: 758) further indicates that this (he refers to it as "Blaikie's approach") contributed to two broader changes:

- Insights from poststructuralist debates about the political origin and institutionalization of environmental knowledge were incorporated, especially the role of environmental discourses and narratives; and
- The increased awareness of the limits of ecological notions of stability and equilibrium that underlie many popular narratives of environmental change and crisis.

Forsyth (2008: 758) states that “much research within political ecology since the 1980s has focused on how and why institutionalized beliefs about environmental change came into place, and on finding alternative, more inclusive ways of addressing environmental problems”.

Political ecology and political economy are closely related concepts, with the current global concern being dominated by the latter. Peterson (2000: 324), for instance, argues that most current political ecology tends to overlook the complexity of ecosystems and ecological dynamics of ecosystems as active agents, focusing solely on the organization of human systems. This view of ecosystems as passive recipients to human transformation would hence be better suited to encapsulate the political economy perspective towards the management of natural resources (Peterson, 2000: 324). Peterson (2000: 324) further contends that ecological services and resources that are available temporally and spatially establish the alternatives that are available to society, which in turn shapes the politics, economics, and management of these ecosystems. The political ecology approach therefore addresses relationships between local resources and their linkages to large-scale political and economic processes, particularly capitalistic market pressures on ecosystems in the Third World (McCarthy, 2002: 1284; Jones, 2006: 46), although McCarthy (2002: 1281) states that the processes of political ecology also have much to offer in the study of First World resource conflicts. A key issue within political ecology is the exploration of multi-level connections between global and local phenomena, not only in environmental functions (such as ecosystem goods and services) but also in decision-making and hierarchies of power (Adger *et al.*, 2001: 682).

Hence, the center of the political ecology approach is based on politics related to the environment, understood as ecological change, together with human knowledge and practice. According to Peterson (2000: 324), “political ecology research that does not address these ecological dynamics may be political, but it is not ecology.... similarly, while politics cannot ignore ecology, ecological approaches need to consider political dynamics in their explanations of human action”. Political ecology typically includes the following issues of concern: access to and control over resources (including uncertainty in property rights regimes), traditional resource management, livelihoods issues, the integration of scales of analysis, the effects of integration into international markets and the effects of limited state capacity (McCarthy, 2002: 1283).

Mauro (2009: 116) illustrates that scale, as a concept, has featured prominently in political ecology and remains a crucial point of analytical reference. Furthermore, he argues that scales are socially and environmentally produced and have both temporal and spatial aspects. Specifically, Mauro (2009: 123) claims:

*Since political ecology offers more context-situated approaches of scale, for example, its production or construction and greater sensitivity with respect to micro-scale society environment relations, it can improve spatio-temporal resolution, reducing analytical losses of detail of explanatory importance, such as may occur through a world-systems paradigm.*

However, it is important that despite the local focus, consideration should be given to the national and global impacts and influences. For example, Brown and Purcell (2005: 607) show that political ecologists’ assumption that organization, policies and action at the local scale are inherently more likely to have desired social and ecological effects than activities organized at other scales can result in what they call “the local trap”. They demonstrate how scalar politics have shaped environmental change in the Brazilian Amazon. In this study the focus of the research is at a local level, a specific part of a coastline in the province of KwaZulu-Natal in South Africa. However, due consideration is given to national and international policies and drivers.

Policy development and critiques are important in relation to political ecology as well. Rocheleau (2008: 716) states that political ecology informs national and international policy-making as well as addresses social movements and alternative development networks. Neumann (2008: 729) identifies three policy issues emerging from Blaikie's work in 1985 (*The Political Economy of Soil Erosion in Developing Countries*) which remain relevant today:

- Policies are often made under conditions of scientific uncertainty or where there is a virtual absence of scientific evidence;
- there is a problem in the relationship between policy and science which stems not only from scientific uncertainty, but also from ideology which results in differing interests and perceptions; and
- conservation policy is about land use, access and control and therefore a political-economic analysis is required to explain why policies fail.

### **2.3. Political ecology in environmental discourses**

Forsyth (2008: 761) indicates that a key theme in political ecology is how far environmental discourses and actors' positionality influence perceptions of environmental and social issues and how these may reflect expressions of power. He asserts that political ecology acknowledges that social values and environmental knowledge are co-produced. Furthermore, it promotes an agenda that allows socially vulnerable people to participate in future knowledge generation:

*...political ecologists are increasingly noting how uncritical environmental science and structural politics give rise to environmental narratives and beliefs that are simplistic and frequently unhelpful to poor people. Political ecology should not adopt separate understandings of politics or ecology, or see one as a guide to the other. The challenge for political ecology lies in understanding both environmental and political change in ways that enhance social justice, but which do not impose apriori notions about each.*

Bryant (1992 cited in Moffat and Finnis, 2005: 454) states that political ecologists argue for a more complex understanding of how politics, human actions and discourses shape

environmental change and natural resource control issues which implies a greater recognition of local agency, knowledge and ability.

The internationalization of sustainability and environmental rights were first heralded in at the United Nations Conference on Environment and Development in 1992, where world leaders and environmentalists alike acknowledged these principles with confidence for a better future for the planet (Adger *et al.*, 2001: 618). This stage also advocated that global environmental problems are solvable through globally coordinated action (Adger *et al.*, 2001: 618). At the heart of these debates is the concern for reconciling the conflicts surrounding environment (biodiversity conservation) and socio-economic development, typically enshrined in protected area conservation initiatives. Adger *et al.* (2001: 618) propose a novel concept of linking the underlying discourse of environmental change to policies and institutions engaged in implementing conservation and development. Peterson (2000: 325) adds a further dimension by highlighting the importance of linking the tensions between ecological and human change to the cast of actors within society at scales from the local to global actors.

The political ecological analysis of conservation draws on two key discourses: the managerial discourse (or government) and the contrasting populist discourse (or governance) to biodiversity conservation (Adger *et al.*, 2001: 1), from the realm of international agreements through to local level governance of institutions. The importance of linkages or networks within each of the discourses is significant as it underlines the interactive nature of policy processes, thus informing it, while at the same time highlighting implementation in institutional contexts (Kickert and Koppenjan, 1997 cited in Celliers *et al.*, 2007: 369). Network analysts believe that the characteristics of an actor in resource use is dependent on how that organization is tied into the larger network of social connections (Celliers *et al.*, 2007: 369). Networks are promoted because shared responsibility for management of resources creates positive incentives for sustainable use and overcomes problems of legitimacy which stems from single actor or government resource management structures (Adger *et al.*, 2001: 2), such as is the case in traditional resource management. Celliers *et al.* (2007: 375) identify three relevant characteristics

that distinguish actors within networks, namely, the scale at which they operate, their power, and the capital at their disposal which play a significant role in influencing policy and implementation of management initiatives.

An actor's scale is regarded as a collection of "spatial and functional parameters and its representivity" where each actor operates within a defined spatial framework which may either be local, regional or national (Celliers *et al.*, 2007: 375). For example, resource conflicts and conservation agendas in the United States have tended to focus on the federal arena (national government jurisdiction) and on the formal, legal realm where conflicts are resolved by looking to the law, thus reinforcing the national government's centrality and minimizing the role of regional or local jurisdictions (McCarthy, 2002: 1286). In Third World contexts the situation differs in terms of scale where the focus is concentrated on the local. McCarthy (2002: 1287) explains that the reasons for this situation relate to the general weakness of central states and the ambiguity surrounding property rights thus rendering linkages such as resource use and access within the community, closer to the ground. Hence, the proposition for community-based resource management where local communities 'allegedly' participate in the design, and benefit sharing from such partnerships (McCarthy, 2002: 1287; Berkes 2004: 621).

The functional parameters of an actor within the network is determined by its "founding charter", that is whether this is legislative, political or private thereby restricting interaction with neighboring actors and the legitimacy with which an actor engages with issues (Celliers *et al.*, 2007: 375). Another facet of scale relates to "the influence of representivity of the agency or institution" for instance the constituency of the actor could be large in geographical extent, but small in number of persons represented (for example, a professional society) or it could be spatially limited but represents a large number of actors directly affected by the policy issues under consideration (Celliers *et al.*, 2007: 375).

The politics of power also operates at different scales. Peterson (2003: 334) identified three dimensions of power:

- Overt power which involves the direct manipulation of power through force, incentives, or intimidation to influence people's decisions. Overt power operates in the here and now because it requires mobilized people, by necessity, it occurs over brief periods at specific locations;
- Covert power, which removes the opportunity for people to behave in specific ways by controlling what type of decisions can be made. Covert power requires the manipulation of institutions, and this manipulation will usually occur over slower and larger institutional scales. Covert power operates by controlling whether issues are discussed or addressed by an institution; and
- Structural power, which is the slowest and broadest scale type of power. Structural power is the ability of the institutions of a society to restrict the set of issues about which people think they can make decisions. Structural power involves manipulating culture, which is slow to change, and likely operates over a broader area than an individual institution, because it determines what concepts are even considered, and therefore requires a group that is relatively insulated from external ideas.

If government regulators, for example, mobilize information and resources from cross-level interactions to reinforce their authority, this often disempowers other stakeholders such as resource users (Adger *et al.*, 2001: 1). Offsetting such impacts, some cross-scale interactions can be empowering for local level user groups in creating social and other forms of capital (Adger *et al.*, 2001: 1). Constanza and Farley (2007: 251) identify four types of capital: built capital (infrastructure, houses), human capital (health, knowledge, and all the other attributes of individual humans that allow them to function in a complex society), social capital (all the formal and informal networks among people such as family, friends, as well as social institutions at all levels, like clubs, local, state, and national governments, Non-governmental Organizations - NGOs, and international organizations), and natural capital (ecosystem goods and services). Moffat and Finnis (2005: 453) indicate that political ecology recognizes and analyzes the relationships

between material, natural and social resources. Their study demonstrates that material resources such as land and social resources such as education are closely related.

Another important aspect that is considered by political ecologists is ethical issues. Escobar (2001: 139) asserts that there is a concern with the moral basis of human thought and action in relation to how oppression and discrimination are inscribed in the material landscapes and ecologies. In relation to the academic endeavor specifically, Jarosz (2004: 917) states that moral and ethical assumptions encompass the ways in which research is conceptualized and practiced, the structures and contents of many courses on offer, teaching philosophies, and academicians' sense of professional obligations and responsibilities. Methodologically, political ecology raises difficult and necessary questions about politics, ethics, and social justice in relation to human activity and environmental change (Lipietz, 1996 cited in Jarosz, 2004: 921).

Linked to ethical issues is the concern over social justice. Forsyth (2008: 756) asserts that Piers Blaikie's writings on political ecology in the 1980s represented a turning point in the generation of environmental knowledge for social justice. In particular, the focus on social justice demonstrated an important engagement with the politics of how environmental explanations are made, and the mutual dependency of social values and environmental knowledge. The importance of 'politics' is underscored and Blaikie's key contribution is not just in linking environmental knowledge and politics, but also in showing ways that environmental analysis and policy can be reframed towards addressing the problems of socially vulnerable people (Forsyth, 2008: 756).

### ***2.3.1 The political ecology of conservation***

Conservation policy and practice has undergone rapid transformation in recent decades, where people, once viewed as threats to conservation efforts are now seen as potential partners in sustainable development initiatives (Brown, 2002: 7; Jones 2006: 51). There has been "a historical progression from 'conservation or development' (fortress conservation) to 'conservation and development' (integrated conservation and

development) to .... ‘conservation through development’ (community based strategies)” (Jones, 2006: 51). These changes in the relationship between people and nature are highly political, embracing issues of rights and access to land and resources, the centrality of the role of the State, the emergence of non-State actors (NGOs and the private sector), and the power of scientific and other understandings of nature (Adams and Hutton, 2007: 151).

For instance, traditional top-down management by government agencies who defined social and environmental goals was a characteristic of conservation initiatives in the 1970s (Adger *et al.*, 2005: 8). These exclusionary approaches to conservation (fortress conservation) perspectives highlight conservation as a threat to human well-being and highlight the alienation of local people from protected areas as a denial of rights to resources and as undermining local livelihoods (Brown, 2002: 7) through “locked-in” patterns of resource use (Adger *et al.*, 2005: 9). Furthermore, a regulatory framework which is imposed on resource users is often resistant to feedback or learning from resource users and civil society (Adger *et al.*, 2005: 8). According to Brown (2002: 7), “this assumes a conflict between livelihood activities and biodiversity strategy”.

The response to traditional resource management approaches has been witnessed in a number of international interventions that turned the tide on exclusion to more inclusive policies, such as the UNESCO World Heritage Convention in 1975 and the World Bank guidelines in 1984 which frowned on the resettlement of local people and made specific provision for the conservation of areas of historical and cultural significance, thereby acknowledging that social aspects are integral to conservation (Adams and Hutton, 2007: 150).

The populist approach in the late 1980s and 1990s sees the adoption of a counter-discourse and normative approach to resource management through the participation and empowerment of local people and communities as central to the more sustainable use of biodiversity (Brown, 2002: 7) through various community-based and co-management arrangements. Community emphasis was motivated by the idea that both management

and resource users would benefit through the simultaneous notion of conservation and development (Berkes, 2004: 622). Management was seen as increasingly decentralized from government agencies to institutions and committees for the co-management through shared management arrangements (Adger *et al.*, 2005: 4). There are a number of benefits to co-management such as reduced enforcement costs, the sharing of knowledge and information on the resource, and systematic learning between all parties (Adger *et al.*, 2005: 4).

The focus on social, economic and political aspects in relation to ecological/environmental problems may result in a neglect of understanding environmental change in relation to natural and physical processes. This concern was raised by Bryant and Bailey (1997: 6 cited in Foryth, 2008: 760) who stated: “political ecologists tend to favor consideration of the political over the ecological...Yet greater attention by political ecologists to ecological processes does not alter the need for a basic focus on politics as part of the attempt to understand Third World environmental problems”. It is, therefore, important that a balanced, integrated approach is adopted. This stance links to the landscape ecology perspective discussed next.

#### **2.4. Landscape ecology**

Closely linked to political ecology is landscape ecology. Blaschke (2006: 198) asserts that landscape ecology addresses the relationship between spatial patterns and ecological processes. Furthermore, he indicates that landscape ecology is orientated towards land use planning by providing indications of optimal ecosystem patterning to support nature conservation (and sustainability). Antrop (2001: 163) supports this view and states that scientists studying landscapes offer new insights about the processes acting in different spatial structures and scales.

Turner *et al.* (2001 cited in Turner, 2005: 320) describe a landscape as an area that is spatially heterogeneous (mosaics) in at least one factor of interest which renders this

definition applicable across scales and adaptable to different systems. Hobbs (1997: 2) asserts that the landscape represents a crucial organizational level and spatial scale at which the effects of global change will be apparent and at which appropriate responses will need to be implemented. Furthermore, management for the conservation of biodiversity and for sustainable land use cannot be planned and conducted sensibly on a site-by-site basis, but rather needs to be tackled at the landscape scale. Hobbs (1997: 1) states that landscape ecology is well placed to play a major role in tackling major conservation and land use issues and in developing responses to the pressing problems arising as a result of human-induced changes. This is in because most landscapes are influenced directly by human activities and decisions which either advertently or inadvertently modify existing landscape patterns and processes. Hawkins and Selman (2002: 211) state that the value of landscape ecology is that it not only informs theory but it also offers solutions to planning problems.

Central to landscape ecology is a focus on understanding the reciprocal interactions between spatial heterogeneity (structure) and ecological processes (functions) and change (Turner, 1998: 173; Li and Wu, 2004: 390; Turner, 2005: 320). Structure refers to the spatial relationships between ecosystems (the distribution of species, energy and materials in relation to size, shape and the different configurations) while function refers to the interaction or flow of material and organisms between the ecosystems (Turner 1998: 173). The recognition of behavior (the ‘function’) as a link between process and pattern by landscape ecologists is exemplified by the concept of landscape connectivity: “the degree to which the landscape facilitates or impedes movement among resource patches” (Taylor *et al.*, 1993: 571 cited in Belisle, 2005: 1989). Because this formalization is associated with the ease with which processes (for example, dispersal) can operate, it is often referred to as the functional connectivity of landscapes (Belisle, 2005: 1989). Change refers to the alteration of structure and function to the mosaic over time (Turner, 1998: 173). It is this latter concept in landscape ecology that has lent itself to the new perspective offered by spatial analysis and modeling (Li and Wu, 2004: 389; Blaschke, 2006: 201).

Landscape ecology emerged in Europe after the second world war where holistic landscape methods of planning and management were applied, primarily in regional geography and vegetation science (Lianyong and Eagles, 2009: 176; Naveh, 2000: 8; Turner 2005: 320). Naveh (2000: 8) contends that the timing of the emergence of landscape ecology coincided with the scientific postmodern ‘scientific revolution’ in Europe which resulted in the emergence of the new field of what could be called ‘complexity science’. This new science has been facilitated by the major paradigm shift from parts to wholes, leading from entirely reductionistic and mechanistic toward more holistic and organismic approaches (Naveh, 2000: 8).

Palang *et al.* (2000: 1) indicate that landscape ecology was initially focused on research that focused on landscape heterogeneity, dynamics and changes with an emphasis on the biophysical landscape elements. They state that humans were often excluded from these studies and when they were included, they were treated generally as external disturbance factors or modeled as socio-economic factors. This, Palang *et al.* (2000: 1-2) argue, resulted in “landscape ecology being mistakenly regarded only as a geographical-spatial ramification of population and ecosystem ecology on larger scales”. The focus now is on integration and understanding the centrality of human influence and impacts on landscapes, especially in built environments, that include “its various human-ecological, social, economic, psychological, spiritual, aesthetic and functional aspects of experiencing and using the landscapes” (Palang *et al.*, 2000: 2). As Li (2000: 27) states, landscape ecology is a way of thinking about the evolution and dynamics of heterogeneous landscapes in its totality, that is, including ecological, social, economic, spatial and physical considerations.

Thus, landscape ecology has developed with two mutually exclusive approaches: it often emphasizes large areas or regions and includes humans and their activities, which reflects a strong anthropocentric focus, which typically reflects the European tradition (Turner, 2005: 320). According to Naveh (2000: 8), this approach is a rejection of dissection, fragmentation and analysis of wholes into smaller and smaller particles, towards integration, connectedness and complementation of perceiving ecological phenomena.

The second approach encompasses the causes and consequences of spatial pattern at changeable spatial scales defined by the organism or process of interest which reflect traditions in North America and Australia (Turner, 2005: 320). In its broadest sense, landscape ecology can be defined as (International Association of Landscape Ecology-IALE, 1998 cited in Palang *et al.*, 2000: 2):

*...the study of spatial variation in landscapes as a variety of scales, including the biophysical and societal causes and consequences of landscape heterogeneity. Above all it is broadly interdisciplinary. The conceptual and theoretical core of landscape ecology has become distinct and recognized, effectively linking natural sciences with related human disciplines.*

Palang *et al.* (2000: 2) extend this definition to include the mutual interactions between landscapes and humans which affect the cultural human perceptions of landscapes, and their sociological, spiritual and psychotherapeutic effects. Recently, IALE (2008 cited in Fry *et al.*, 2009: 934) revised their definition to: “Landscape ecology is the study of the interactions between the temporal and spatial aspects of a landscape and its flora, fauna and cultural components”.

Landscape ecology presents a radical departure from an exclusively linear and deterministic view, from a belief in the indisputable objectivity and certainty of the scientific truth towards the recognition of the limits of scientific knowledge, and to effectively deal with the non-linear dynamics and complexity that is characteristic of landscapes (Naveh, 2000: 8; Wu and Hobbs, 2002: 360). Naveh and Lieberman (1994 cited in Wu and Hobbs, 2002: 360) emphasize the relevance of general systems theory, and chaotic processes based on systems thinking of complexity, networks and hierarchic order. Landscape ecology turned from the recognition of human wisdom and traditional common sense, to the need for a contextual view of reality, and the need to deal with uncertainties (Naveh, 2000: 8).

Potschin and Haines-Young (2006: 162) assert that the sustainability debate has had a profound influence on contemporary landscape ecology. This is in keeping with the integrated focus; the development of concepts and tools for sustainable landscape

planning, biodiversity conservation and environmental management; and addressing issues in a manner that considers the concerns and perspectives of different stakeholders. Sustainability science in particular highlights the relationships between science and society as well as researchers and end users. Kates *et al.* (2001: 641 cited in Potschin and Haines-Young, 2006: 166) emphasize the relevance of landscape ecological thinking to the concerns of sustainability science in relation to the following core questions:

- How can the dynamic interactions between nature and society, including lags and inertia, be better incorporated into emerging models and conceptualizations that integrate the Earth system, human development, and sustainability?
- How are long-term trends in environment and development, including consumption and population, reshaping nature-society interactions in ways relevant to sustainability?
- What determines the vulnerability or resilience of the nature-society system in particular kinds of places and for particular types of ecosystems and human livelihoods?
- Can scientifically meaningful ‘limits’ or ‘boundaries’ be defined that would provide effective warning of conditions beyond which the nature-society systems incur a significantly increased risk of serious degradation?
- What systems of incentive structure (including markets, rules, norms and scientific information) can most effectively improve social capacity to guide interactions between nature and society toward more sustainable trajectories?
- How can today’s operational systems for monitoring and reporting on environmental and social conditions be integrated or extended to provide more useful guidance for efforts to navigate a transition toward sustainability?
- How can today’s relatively independent activities of research planning, monitoring, assessment and decision support be better integrated into systems for adaptive management and societal learning?

These questions, in part, guide this research endeavor since, together, they are able to provide a holistic assessment of coastal zone concerns and management issues in northern KwaZulu-Natal.

An important component of landscape ecology is the development of appropriate indicators. As Fry *et al.* (2009: 933) state that “indicators can be used to summarize complex information about landscape functions and the ability to extract a common set of indicators for analyzing different landscape functions may provide valuable support for multiple-use planning”. Liding *et al.* (2008: 5521) state that landscape indices or landscape metrics which are often used in landscape pattern analysis, have played a critical role in popularizing landscape ecology. Landscape indicators are crucial since they are central to assessing changes, environmental management interventions and they can play a useful role in informing policy development. Fry *et al.* (2009) discuss the importance of using both visual and ecological landscape indicators. They state that the development of indicators for monitoring and analysis of landscape change has mainly focused on ecological indicators at the neglect of human perceptions. Perceptions are critically important since perceptions inform decisions which lead to action. As Gobster *et al.* (2007 cited in Fry *et al.*, 2009: 934) state in outlining a model for human-environmental interactions in the landscape:

*The focus of the model is the perceptible realm where aesthetic experiences occur and where intentional actions towards landscapes can directly or indirectly affect ecological functions. . . [it] provides the most active intentional contact between environmental and human phenomena - where the process of perception leading to action most directly links human systems with ecosystems.*

Soliva and Hunzike (2009: 284) also highlight the importance of analyzing people’s assessments of landscape scenarios. They assert that changes in landscapes and biodiversity are perceived and assessed by people in different ways primarily because they are influenced by a range of factors including aesthetic perceptions and their values, assumptions, knowledge base, personal interests and life situations. Luz (2000: 157) states that social aspects in landscape planning and ecology were neglected in the past. They call for the development of participatory landscape ecology that ensures the participation of local actors and stakeholders in the planning processes.

## 2.5 Interdisciplinary studies and landscape ecology

Musacchio *et al.* (2005) indicate the transformation of landscapes globally in the last two centuries have brought to the fore the importance of interdisciplinary studies in examining these changes. They assert that interdisciplinary studies in terms of examining changing landscapes have focused on the “causes and effects of land use and land cover dynamics as well as the ecological and social impacts of alternative design, planning, policy, and management schemes on landscapes and regions” (Musacchio *et al.*, 2005: 326). This is now a critical component of landscape ecology, specifically landscape ecological change research. Challenges, identified by Musacchio *et al.* (2005: 326) in developing collaborative research projects and operationalizing interdisciplinarity, include integrating different disciplinary theoretical foundations, research traditions, methodological tools and functional vocabularies. However, they assert that these are “dynamic tensions” (Musacchio *et al.*, 2005: 328) and despite these concerns, given the complexity of both the ecological and social dynamics associated with landscapes, interdisciplinarity remains critically important. Furthermore, Table 2.1 illustrates the continuum of interdisciplinary research. This specific study utilizes informed disciplinarity in the sense that while the researcher is a geographer (that is, it is an individual research effort with no other collaborators from other disciplines participated), the research draws from the social, environmental and spatial sciences.

Table 2.1: Lattuca’s continuum of interdisciplinary research (Musacchio *et al.*, 2005: 329 adapted from Lattuca, 2001: 81)

<i>Type of research</i>	<i>Definition</i>
Informed disciplinarity	Discipline questions requiring outreach to other discipline(s)
Synthetic interdisciplinarity	Questions that link disciplines
Transdisciplinarity	Questions that cross disciplines
Conceptual interdisciplinarity	Questions without a compelling disciplinary basis

Hobbs (1997: 1) argues that to address environmental concerns and pressures, landscape ecology needs to integrate various relevant disciplines in relation to a coherent theoretical

structure and principles. He calls for “active efforts to produce a truly integrated science, the development of sound landscape design principles and increased interaction with policy, planning and management” (Hobbs, 1997: 1). Palang *et al.* (2000: 1) call for a holistic landscape ecology that meets “the challenges of the emerging information and communication-rich society, by joining the transdisciplinary scientific revolution and its paradigm shifts from conventional reductionistic and mechanistic approaches to holistic and organismic approaches of wholeness, connectedness and ordered complexity”.

## **2.6 Integrated Coastal Zone Management (ICZM) as an environmental discourse**

With regard to coastal and marine areas, ICZM has been discussed as a governance concept because it refers directly to sustainability and displays a high degree of correspondence with an emphasis on vision building, policy integration, inclusion and participation and the integration of various sectoral interests (Sonak and Shaw, 2006: 1; Osthorst and Lange, 2007: 1). These traits are discernable in the following definitions of ICZM. The Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP, 1996: 66) defines ICZM as:

*... a broad and dynamic process...that requires the active and sustained involvement of interested public and many stakeholders with interests in how coastal resources are allocated and conflicts are mediated. The ICM process provides a means by which concerns at local, regional and national levels are discussed and future directions are negotiated.*

Torell (2000: 354) defines ICZM as:

*...a continuous and dynamic process by which decisions are made for the sustainable use, development and protection of coastal areas and resources. Coastal management requires both understanding complex, dynamic ecological systems and creating governance systems capable of addressing issues of concern to society.*

The elementary principle of all ICZM initiatives is to maintain and protect the qualities of coastal ecosystems and their associated human societies (Olsen, 2003: 347). ICZM also deals with the integration of conservation across various scales and the many stakeholders and interests in the coastal zone (Isager, 2008: 6). The rhetoric under which most development planning in coastal areas is carried out ('sustainable development' and 'integrated coastal zone management') is founded on such principles (International Union for Conservation of Nature - IUCN, 2007: 1). ICZM has received 'hegemonic' status regarding the way to plan and manage coastal environments (Isager, 2008: 8). However, according to Olsen and Christie (2000: 6), the concept of ICZM has distinct meanings to various stakeholders and, as a result, is in need of critical evaluation.

## **2.7 Conclusion**

The framework in this study uses three interrelated approaches: political ecology, landscape ecology and ICZM. ICZM is examined in greater detail in the next chapter as well. The framework examines social, economic, ecological and spatial dimensions and concerns. The integrated framework adopted in this study also permits an examination of policy processes and impacts. In particular, it underscores the importance of effective policy approaches and implementation in curbing anthropogenic pressures on coastal zones and resources.

A central aspect emerging from the above discussion is the importance of spatial analysis. Several authors (Ayad, 2005; Steiniger and Hay, 2009; Uy and Nakagoshi, 2008) highlight the importance of using GIS and remote sensing in understanding and modeling landscape change and informing planning efforts. Ayad (2005: 307) states that there has been an increasing interest in the visual and aesthetic values of landscapes which has led to a growing interest in the use of spatial data and GIS methodology in assessing visual/physical attributes of the landscape. Steiniger and Hay (2009: 183-184) state that geographic information tools have become an essential component of research in landscape ecology given its focus on variations over multiple spatial and temporal scales. They assert that GIS is increasingly being used as the principal tool for the digital

exploration of variations in landscapes since they provide the necessary functions for spatial data collection, management, analysis and representation. The use of GIS specifically is discussed in greater detail in chapter 5 (methodology chapter) since GIS is a tool used in this study. However, it is important to note that spatial analysis does not only refer to the use of GIS and remote sensing but includes a focus on stakeholder perceptions of spaces and places. This is in keeping with the interdisciplinary approach advocated in this chapter that calls for the integration of social, spatial and ecological sciences.

## CHAPTER 3

### Literature Review

“Coastal zones are a well chosen test site, because so many interests occur. So, can we succeed in the coastal zones, we can succeed anywhere” (Bakdal, cited in Banica *et al.*, 2003: 4).

#### 3.1. Introduction

The cumulative effects of local changes, is increasingly being linked to the global phenomenon of human influence on nature, referred to as the ‘anthropocene’ (Steffen and Tyson, 2001 cited in Blaschke, 2006: 201). This coupled with global climate change and the resulting sea level rise and intensity and frequency of storms, makes coastal zones of the world one of the most intriguing and current environments to study. Today more than 50% of the coastal countries have from 80 to 100% of their total population living within 100 km of the coastline (Martínez *et al.*, 2007: 254). Coastal environments also occupy one of the most dynamic interfaces between land and sea, and support the most diverse and productive habitats. They are also sites of intense conflict over use of these coastal resources.

The high pressures for coastal development, translated as prolific land cover transformation, coupled with the diachronic weaknesses of management to protect the coastal environment has led to the gradual deterioration of environmental conditions in many coastal areas. Land use decisions in coastal areas are based on opportunities and constraints affected by both biophysical and socio-economic drivers, and hence present one of the main issues integrating the large debate on sustainable development in coastal zones (Lourenço and Machado, 2007: 1). Coastal zones therefore will require integrated and strategic management efforts in order to reconcile the intense divergences that clash in this narrow zone.

This chapter explores the different interests which have a stake in the coastal zone, and their relative power of influence over its management or mismanagement. Furthermore, the chapter interrogates the field of integrated coastal zone management (ICZM), advocating the need for a systemic and integrated approach to its management. Strategic environmental assessment (SEA) is one such tool that can be harnessed to manage coastal zones if there is to be any hope for reconciling the plethora of dependencies and conflicts arising from intense resource use. However, lack of political will and effective technical know-how is seriously impeding efforts to this end. The chapter concludes by proposing the integration of spatial data and analysis as a means to inform and improve coastal decision-making.

### **3.2 Coastal Zone: An interlink between systems**

Planet Earth is a coastal planet, comprising 361.13million km<sup>2</sup> of water (71% of total planet surface) and 148.94 million km<sup>2</sup> of land area (29% of total planet surface) which both interact intensively and extensively along the world's total 1 634 701 km of coastline (Martínez *et al.*, 2007: 255), producing the world's most unique and attractive areas. Coastal environments occupy one of the most dynamic interfaces between land and sea, and they support some of the most diverse and productive habitats (McClean and Tsyban, 2001: 356). Furthermore coastal zones stand out as areas of extraordinary changes, shaped both by natural processes and human society which impact either directly on coastal processes and systems and/or indirectly through modification of the natural processes and global climate change (Land-Ocean Interactions in the Coastal Zone - LOICZ, 2005: 1). The physical interactions between marine, fluvial and terrestrial systems affect the 'foundations' (ecological, human utilization and disaster prevention functions of the coastal zone) of coastal societies and ultimately, the health and viability of coastal zones (Haag, 2002: 5).

Rodriguez *et al.* (2009: 100) state that since the 19<sup>th</sup> century (mainly with the advent of increased tourism); the coast has been subjected to intense exploitation aimed at offering progressively more demanding services (this aspect is discussed later in the chapter).

However, they warn that notwithstanding the coasts' value as an important generator of economic, social and landscape resources; it is often forgotten that the coast is a very vulnerable environment, with the highest biological and geological values, that needs strong protective measures in order to be preserved. The authors further assert that the diversity of uses and activities developed in the littoral area makes it necessary to seek the most suitable way to attain compatibility among them and, at the same time, preserve the environment.

### ***3.2.1. Natural coastal systems***

The world's coastal zone is a long narrow feature of mainland and adjacent seas representing a zone of transition between land and ocean (LOICZ, 2005: 1). The 'shoreline' or 'coastline' is the tangible border between the two, while the coast is more encompassing and includes areas above and below the high water mark, such as dunes, cliffs and estuaries (Woodroffe, 2002: 2). The 'coastal zone' is defined as the broad transitional area in which land and ocean meet and interact (Haag, 2002: 5). Coasts are dynamic features where the land and sea rarely interact at a fixed boundary, which is a direct result of the migration of the shoreline either daily (for example, with the tides and precipitation river flow); seasonally (for example, climatic patterns), over longer time scales (for example, as the coast erodes and deposits) to millennial scales (for example, sea level changes) (Woodroffe, 2002: 6; Abuodha and Woodroffe, 2006: 1).

The extensive distribution of coasts results in a variety of geomorphological features, weather regimes, biomes and level of resistance to change; including soft-shores, rocky shores and cliffs, hilly or flat coastal plains, narrow or wide coastal shelves and a wide variety of interdependent aquatic systems (wetlands, estuaries, salt marshes and deltas) (Martínez *et al.*, 2007: 255 ). Rocky coasts, characterized by cliffs are the most resistant to change while sandy coasts are more mobile and vulnerable to change (Woodroffe, 2002: 4). Deltas or estuaries are found where rivers reach the sea and hence the coastal zone also extends upstream to where the tidal influence in estuaries is felt (Woodroffe, 2002: 4). Coastal ecosystems can encompass a wide range of environmental conditions

over short distances, such as salinity (from fresh to hypersaline) and energy (from sheltered wetlands to energetic wave-washed shorelines) (McLean and Tsyban, 2001: 356), which results in very specific and distinct fauna and flora characteristics. At a much larger geographical scale, there is heterogeneity of climate types, from tropical to polar, with corresponding broad-scale differences in biogeophysical processes and features (McLean and Tsyban, 2001: 356). These differences result in, for example, an equally large variety of highly specialized biomes found along the coasts, such as different kinds of forests (tropical and temperate, evergreen and deciduous), shrubs, and savannas on the terrestrial portion of coasts (Martinez, 2007: 255).

These interdependent systems are characterized by significant biogeochemical processes and functions. Due to the many habitat types and a wealth of species and genetic diversity, coastal ecosystems provide numerous ecosystem services. For example, it accounts for at least 15% of oceanic primary production, 80% of organic matter burial, 90% of sedimentary mineralization, 75-90% of the oceanic sink of suspended river load and it represents 90% of the world fish catch (Gattuso and Smith, 2007: 2). Furthermore, its overall economic value has been recently estimated as at least 40% of the value of the world's ecosystem services (Gattuso and Smith, 2007: 2). These include services on the terrestrial side of the shoreline such as dunes and estuaries which act as sediment sinks (which replenish the beach during episodes of sediment deficit and hence maintain beaches), wetlands and mangroves cycle nutrients and filter pollutants from inland freshwater systems (thereby ensuring a constant fresh water supply for the organisms that depend on such conditions to meet their biological requirements), among others (Burke *et al.*, 2001: 1). Conversely, on the marine side, oceans play a vital role in regulating global hydrology and climate and are a major carbon sink and oxygen source because of the high productivity of phytoplankton (Burke *et al.*, 2001: 1). These vital roles of coastal zones as both regulators and sinks present important positive and negative feedbacks in land-coast systems that determine thresholds and boundaries for system resilience (Turner *et al.*, 1995: 5) to global environmental change.

### ***3.2.2 Human coastal systems***

Coastal zones include natural ecosystems, but in addition, also important managed ecosystems, economic sectors, and major urban centers (McLean and Tsyban, 2001: 356). This is reflected in the fact that coastal zones around the world share a number of characteristics that define both their value and vulnerability, such as a high population density with a large number of urban conglomerations (for example, Tokyo, Shanghai, Jakarta, Bombay and New York), and hence, in most countries, also a rapid population growth (Shi *et al.*, 2001: 412). Coastal areas also face high in-migration (such as from the hinterland to the coast or from rural areas to coastal urban areas) as people seek employment in these coastal areas (Jorge *et al.*, 2002: 23). The trend of increasing coastal urban population is expected to continue globally with the most striking increases projected to be in the developing countries of Asia, Africa and South America (Turner *et al.*, 1995: 3). The correlation between the high population and equally high poverty levels in these countries has serious implications for coastal resource use and management.

The United States Agency for International Development (USAID, 2007: 1) asserts that coastal communities around the world of different sizes and in different localities are becoming increasingly vulnerable to a wide range of coastal hazards including severe storm events, tsunamis, shoreline erosion, and coastal resource degradation which are linked to the constantly increasing coastal population. USAID (2007: 1) underscores that an estimated 23% percent of the world's population (1.2 billion people) and more than 50% of the Indian Ocean region's population lives within 100 kilometers of shoreline and 100 meters of sea level. These coastal populations live in medium cities and rural areas where, according to USAID (2007: 1), basic services and disaster warning and response mechanisms are limited. USAID (2007: 1) argues that population density together with increasing frequency and duration of storms, sea level rise, and other coastal hazards cause the impacts of disasters to be more severe and recovery to be slower and less sustainable. USAID (2007: 1) states that "while many coastal hazards are beyond the community's capacity to control them, proactive measures can be taken to reduce vulnerability and provide the enabling conditions for communities to absorb and bounce

back from disruptions in basic services and economic activity”. They argue for the development of resilient coastal communities who are able to understand coastal hazards, take deliberate and coordinated actions to reduce vulnerability, and have appropriate and practiced contingency plans to respond to disaster events.

Shi and Singh (2003: 148) in their projections of population density in the world’s coastal areas revealed an average of 77 people per km<sup>2</sup> in 1990 and 87 people per km<sup>2</sup> in 2000 (Figure 3.1). Their projected future population density reveals that in the years 2010, 2025 and 2050, population density will increase to 99 people per km<sup>2</sup>, 115 people km<sup>2</sup> and 134 people km<sup>2</sup>, respectively (Shi and Singh, 2003: 148). Furthermore, population density in coastal zones will be much higher than in inland areas, which is expected to be 38 people per km<sup>2</sup> in 2010, 44 people per km<sup>2</sup> in 2025 and 52 people km<sup>2</sup> in 2050 (Shi and Singh, 2003: 148).

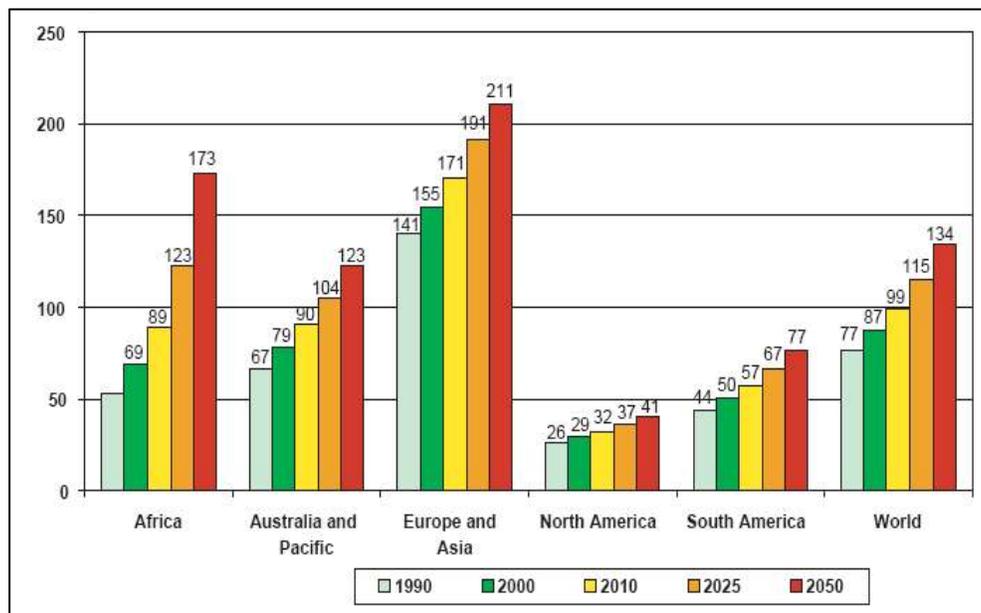


Figure 3.1 Population density (people per km<sup>2</sup>) trends in coastal zones by continent (Shi and Singh, 2003: 1489)

According to 2003 data, 2 billion and 385 million people live within the coastal limit, which represents 41% of the world’s global population (Martínez *et al.*, 2007: 254). Furthermore, 21 of the 33 world's megacities are found on the coast (Martínez *et al.*,

2007: 254), signifying that the world's coastal areas are increasingly becoming urbanized. Blaschke (2006: 201) asserts that changes to natural environments, as a result, may already depend more on human actions than on natural ecological conditions and hence argue that in retrospect the ecological and socio-economic realms are intricately linked. Hinrichsen (1998 cited in Curran *et al.*, 2002: 265) aptly concur that in the world's coastal zones, "ultimately ...all of humankind is coastal".

Human coastal populations are also identified by their impacts on coastline, where economic activity is almost always synonymous with economic growth and development. There are several generic non-demographic land-based and marine-based activities of such economic growth and development which are remarkably similar across a wide range of societal and geographic settings which interact with population changes and results in subsequent disastrous impacts on coastal ecosystems. These relate to coastal and marine pollution, habitat loss and degradation, and erosion (Nelson *et al.*, 2006: 5).

A significant driver of ecosystem change in the coastal zone is the opening up of biogenic nutrient cycles due to agricultural inputs (fertilizers and agrochemical), the treated and untreated wastewater the hinterland produces in the respective catchments, sewer from poorly managed treatment plants and industrial wastes (Nelson *et al.*, 2006: 7). The most notorious of these is the much increased movement of nitrogen and phosphorus which has meant increased exchanges between land and surface water and consequent impacts on the ecological functioning of aquatic systems, habitat degradation, decline in water quality and impacts on fisheries (Turner, 2000: 448). In many watersheds, nutrient delivery by rivers to coastal waters has been increasing as a result of human activities, which has resulted in significant coastal 'dead zones', decreases in coastal biodiversity, and increased frequency and severity of harmful algal blooms and coastal eutrophication (Dumont *et al.*, 2005: 1).

Habitat loss and degradation in coastal zones is occurring worldwide through development activities such as reclamation projects, conversion of mangroves for aquaculture, and removal of coastal forest for land use development and agriculture

(Nelson *et al.*, 2006: 8). Aquaculture, the world's fastest growing food production activity, plays an essential role in the livelihoods of millions of people around the world (Creel, 2003: 4). According to the Food and Agricultural Organization (FAO), in 2006, 43.5 million people were directly engaged, part-time or full-time, in the primary production of fish, either by fishing or in aquaculture, accounting for 3.2% of the 1.37 billion people economically active in agriculture worldwide (FAO, 2009: 23). While this appears to be a booming economic sector in that aquaculture and fisheries provides inexpensive sources of nutrition, foreign exchange earning potential, and employment opportunities, it has also had negative social, economic and environmental consequences (Creel, 2003: 4).

Some of these negative impacts relate to intensive groundwater abstraction and consequent pressures for water for local communities, pollution due to effluent discharge, depletion of the wild stock due to disease outbreaks in association with the introduction of exotic species, limits the agricultural potential in other areas, and it involves the rapid conversion of mangroves for such projects (Burke *et al.*, 2001: 7). In addition, the economic demands placed on coastal environments from land use conversion to residential and tourist development is significant. These considerable large-scale influences in the coastal zone will be discussed in detail in the following sections.

Demographic and other socio-economic trends have combined to produce a growing urban and industrial concentration in the coastal zones worldwide. Therefore, the extent of the coastal zone is further defined by the area in which terrestrial and marine processes interact, depend on and influence each other in complicated and reciprocal relationships. Furthermore, the variety of demands for utilization and protection collide in this area making it a zone of problems, but also of potentials (Lourenço and Machado, 2007: 2), if managed appropriately. This approach to coastal areas reflects a distinctive way of understanding the inter-linkages between the natural and human dimensions of coastal areas.

### 3.3 Coastal ecology

For a meaningful association, and one that has traditionally been ignored in the past treatment of coastal areas (where terrestrial and marine zones were at the receiving end of dichotomous management intervention), the coastal zone has been defined to include the intertidal and sub-tidal areas and immediately adjacent lands. This definition therefore includes areas that are routinely inundated by saltwater. Because the definition of coastal ecosystems is based on their physical characteristics (their proximity to the coast) rather than a distinct set of biological features, they encompass a much more diverse array of ecosystems than do the other contexts (Burke *et al.*, 2000: 1). For example, features such as dunes, coral reefs, mangroves, wetlands, estuaries, highly specialized flora and fauna and a variety of other ecosystems which are only found in the coastal zone, provide their own unique set of goods and services and face somewhat different pressures from other ecosystem contexts (Burke *et al.*, 2000: 1).

The study of ecology has had a long tradition in the spatial patterns and geographic distribution on organisms in ecosystems and their relation to macro-climatic factors such as temperature and precipitation (Turner, 1989: 171). An ecosystem is a dynamic complex of plant, animal, and microorganism communities and the non-living environment interacting as a functional unit which can be defined in terms of distinguishing characteristics (for example, a wetland ecosystem, a freshwater ecosystem or a terrestrial ecosystem), of which humans are an integral part (Millennium Ecosystem Assessment, MEA, 2003: 8). Ecosystems are renowned for the goods and services that they provide, which has been defined by the MEA as provisioning (food, fiber), regulating (climate regulation and disease control), supporting and cultural services; and non-material benefits such as spiritual or aesthetic benefits (MEA, 2003: 3).

Ecosystems and biodiversity are closely related concepts. Biodiversity is “the variability among living organisms from all sources, including terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part” (MEA, 2003: 9). It includes diversity at all organizational levels, that is, from genetic diversity within

populations to the diversity of ecosystems in landscapes, thus biodiversity underpins ecosystems and their goods and services (Chapin *et al.*, 2000: 234). Composition, structure (patterns) and functions (processes) are recognized as the primary and interdependent attributes of biodiversity (Kuyler, 2006: 10):

- Composition refers to the relative abundance of habitats or species and measures of their diversity, richness and distribution (Noss, 1990 cited in Kuyler, 2006: 10). The provision of ecosystem goods and services depends not only on species' presence or absence but also on their abundance (Chapin, 2000: 234);
- structure refers to the physical and organization or pattern of an ecosystem, from habitat complexity and population structure as measured within communities to the pattern of patches, porosity, connectivity and other elements at the landscape level (Noss, 1990 cited in Kuyler, 2006: 10); and
- Function refers to the interactions among the spatial elements of a landscape (including flows of energy, materials and species among component ecosystems). It also includes ecological and evolutionary processes such as gene flow disturbances and nutrient cycling, pollination and seed dispersal among others (Noss, 1990 cited in Kuyler, 2006: 10) and is therefore considered responsible for the maintenance of natural systems. The resilience of an ecological system relates to the functioning of the system, rather than the stability of its component populations, or even the ability to maintain a steady ecological state (Adger, 2000: 349). Resilience is defined as the capacity of ecosystems to absorb frequent or periodic natural and human stresses, while continuing to regenerate without gradually degrading or unexpectedly flipping into alternate states (Burke *et al.*, 2003: 21). According to Adger (2000: 349), coastal and estuarine ecosystems are typical of low species diversity due to periodic physical changes and high a degree of organism mobility. Yet, Costanza *et al* (1995 cited in Adger, 2000: 349) argue that coastal ecosystems are highly resilient because of their high levels of functional diversity.

According to Shi and Singh (2003: 149), in the past, coastal land designated as protected has often taken place without regard to the biodiversity within their boundaries and as a result many protected areas have little significance in terms of biodiversity, and, conversely, many areas of habitat with significant biodiversity lack protection; hence, it is important to identify areas rich in species diversity and endemism for priority setting purposes (Shi and Singh, 2003: 149). Coastal ecosystems are essential for human well-being and provide vital services and options for communities to buffer the impacts of environmental disturbances, extreme events and global change (Galaz *et al.*, 2008: 1).

Furthermore, coastal ecosystems provide multiple goods and services, such as coral reefs (the most biologically diverse and economically important ecosystems on the planet), and provides ecosystem services that are vital to human societies and industries through fisheries, coastal protection, building materials, new biochemical compounds and tourism (Hoegh-Guldberg *et al.*, 2007: 1737). However, many important coastal ecosystems are disappearing at a rapid rate, particularly over the last 50 years (Martinez *et al.*, 2007: 270). In addition to changes in biodiversity that will impact on ecosystem functioning, the destruction of coastal ecosystems will have economic impacts through the provision of ecosystem goods and services to society (Chapin *et al.*, 2000: 240).

### **3.4 Ecological economics and the coast**

The world's economies are based on the biodiversity and goods and services derived from ecosystems. Measured both in terms of biological productivity and the value of ecosystem services, coastal systems are the most productive (Jin *et al.*, 2003: 138; Costanza and Farley, 2007: 251). Furthermore, these ecosystems are essential for human well-being and human security and provide important services and options for communities to buffer the impacts of environmental disturbances, extreme events and change (Galaz *et al.*, 2008: 1).

Foremost, the distinction between two inherently interconnected and interchangeable aspects related to definitions of 'well-being' and 'security' are discussed. 'Well-being', as

defined by the MEA (2003: 216), refers to the “context-and-situation dependent state, comprising basic material for a good life, freedom and choice, health, good social relations, and security”. Soroos (1997 cited in Sonak and Shaw, 2006: 1) defines security as “the assurance people have that they will continue to enjoy those things that are most important to their survival and well-being”. Since the concept of security is encapsulated in the definition of well-being, this thesis will use the term well-being for purposes of linking ecosystem services to society.

The multiple benefits derived from coastal ecosystems goods and services are well documented (Burke *et al.*, 2001: 2; Creel, 2003: 2; Galaz *et al.*, 2008: 1). These include benefits such as coastal ecosystems provide coastal protection functions, for example, storm surges and extreme waves can be moderated by healthy coastal ecosystems such as salt marshes, coral reefs and mangrove forests (Galaz *et al.*, 2008: 1). Wetlands provide a number of important ecosystem services and have the ability to buffer droughts and floods (Creel, 2003: 2). Coral reefs underpin local shore protection, fisheries and tourism, and are a vital source of food and income in many regions of the developing world. In addition, coastal ecosystems assist in preventing erosion, filtering pollutants; and providing food, shelter, breeding areas, and nursery grounds for a wide variety of organisms. Coastal regions also provide critical inputs for industry, including water and space for shipping and ports; opportunities for recreational activities such as fishing and diving; and other raw materials, including salt and sand, and attractive areas for residence (Creel, 2003: 2). Furthermore, coastal areas are frequently centers of economic activity, industry, population growth and transport links (Burke *et al.*, 2001: 2).

The contributions of these ‘free’ ecosystem goods and services to national economies (including well-being) are substantial, yet they are generally ignored or underestimated by decision-makers (IUCN, 2007: 1; Wiethuchter, 2008: 5). Furthermore, the costs or externalities associated with loss of ecosystem goods and services tend to be considerable (van den Bergh, 2000: 5). This is particularly acute in the coastal zone due to a lack of adequate market price data (or absence of data), together with inadequate (or absent) property rights regimes which ensure that resource values can be practicably

appropriated, thereby assigning ecosystem services with little or zero value and weight in policy decisions (Jin *et al.*, 2003: 139).

In most countries coastal resources (coastal waters and coastal public property) are considered 'commons'; that is, they are not owned by any person or agency but are common property available equally to all citizens, with the government as 'trustee' (Jinn *et al.*, 2003: 139), as is the case in South Africa (DEAT, 2000a: 47). This common property nature makes it impossible to exclude those who do not pay for enjoying or using them, and as a result there is no incentive to conserve such resources and overuse and exhaustion can occur when utilization or harvest rates exceed the population growth rates of species or the ability of ecosystems to recover from disturbances (Jin *et al.*, 2003: 139). Too often traditional controls over the allocation and use of coastal space and coastal resources disintegrate when markets and associated societal behaviors contrary to traditional controls become prevalent (Olsen and Christie, 2000: 7).

Market efficiency requires privatization of coastal resources as resources managed under open access regimes are particularly vulnerable to overexploitation (Degnbol *et al.*, 2003: 6). This is because what is the rational level of exploitation from the perspective of society (maximization of the resource rent) is not rational from the perspective of the individual (dissipation of the resource rent), thus incentive for any individual to engage in a collective action to change the management regime depends on the distribution of the benefits (Degnbol *et al.*, 2003: 6). If the benefits are available to everybody, there is no such incentive, hence explaining the absence of collective action in coastal zone management, even in situations where resources are on the verge of collapsing (Degnbol *et al.*, 2003: 6).

Conventionally, economists have approached questions of environmental valuation using the “familiar language of individual consumer preferences and production relationships” (Wilson and Howarth, 2002: 434), and hence economic valuation of ecosystem goods and services occurs in isolation of current realities (such as the limits placed on an ecosystem’s ability to produce or regenerate from disturbances or overexploitation).

However, common property resources such as forest, agricultural land, fisheries or water are critically important for poor communities who are largely dependent on the ecosystem services provided by these common resources (Sonak and Shaw, 2006: 5). Hence, the issue of social equity is often not dealt with in conventional economic analyzes of ecosystem goods and services (Wilson and Howarth, 2002: 434). According to Curran *et al.* (2002: 264), the coastal zone is the focus point of contestation due to the plethora of different user stakeholders present, as well as the potential of coastal resources to generate multiple products and services, thereby intensifying conflicts and necessitating trade-offs, which result in significant environmental degradation.

There is, however, substantial and growing evidence that natural systems contribute heavily to human well-being, with the annual, non-market value of the earth's ecosystem services being substantially larger than global Gross Domestic Product (Costanza, *et al.*, 1997 cited in Costanza and Farley, 2007: 250). Current paradigm shifts in economic thinking are cumulatively aggregating towards what is termed ecological economics. Ecological economics is allied with sustainable development (intra-and inter-generational equity); viewing of the economy as a subsystem of a larger local and global ecosystem that sets limits to the physical economic growth and a methodological approach based on the use of physical (material, energy, chemical, biological) indicators and comprehensive systems analysis (Wilson and Howarth, 2002: 431; van den Bergh, 2000: 2).

According to van den Bergh (2000: 6), ecological economics emphasizes the following: “basic needs, the complex link between poverty and environment, the ‘precautionary principle’ (linked to environmental sustainability, with much attention to ‘small-probability-large-impact’ combinations), concerns for instability of ecosystems, loss of biodiversity, and environmental ethical considerations”. Hence it differs from conventional economics which tends to emphasize ‘efficiency’, in that ecological economics relies on promoting ‘distribution’ (van den Bergh, 2000: 6). Wilson and Howarth (2002: 441) concur by arguing that ecosystem goods and services are not owned by individuals but rather shared collectively by social groups; hence the allocation of

public goods affects other people, raises normative and ethical questions, and directly affects social well-being.

It is believed that ecological economics can inform society and decision-makers trying to cope with the allocation of open and scarce resources among competing demands (Turner *et al.*, 2003: 494), typically in coastal environments. Furthermore, ecological economics has been most successful in promoting multidisciplinary research in which natural (ecologists) and social scientists (economists) collaborate (van den Bergh, 2000: 2), which is considered essential in any management of the coastal zone (Turner, 2000: 448).

#### ***3.4.1 Value of coastal ecosystem goods and services***

The current thinking about drawing links between biodiversity and ecosystems and issues of human well-being have been endorsed by global commitments such as the Plan of Implementation adopted at the World Summit on Sustainable Development (WSSD) and the United Nations Millennium Development Goals (MEA, 2003: 2). The MEA offers a framework for understanding the linkages between ecosystem services and human well-being and shows how ecosystem services (supporting, provisioning, regulating and cultural) underpin the social and economic well-being (comprising basic material for a good life, freedom and choice, health, good social relations, and security) of communities found in coastal areas (IUCN, 2007: 2) (Figure. 3.2).

Furthermore, this framework recognizes the importance of protection (for example, vulnerability to environmental shocks and stresses), empowerment (for example, the opportunity to express values related to ecosystems), basic needs (for example, the ability to have adequate and clean drinking water) and education (opportunity to observe, study and learn about ecosystems), thus presenting individuals with options and opportunities to fulfill his or her own potential (Sonak and Shaw, 2006: 3).

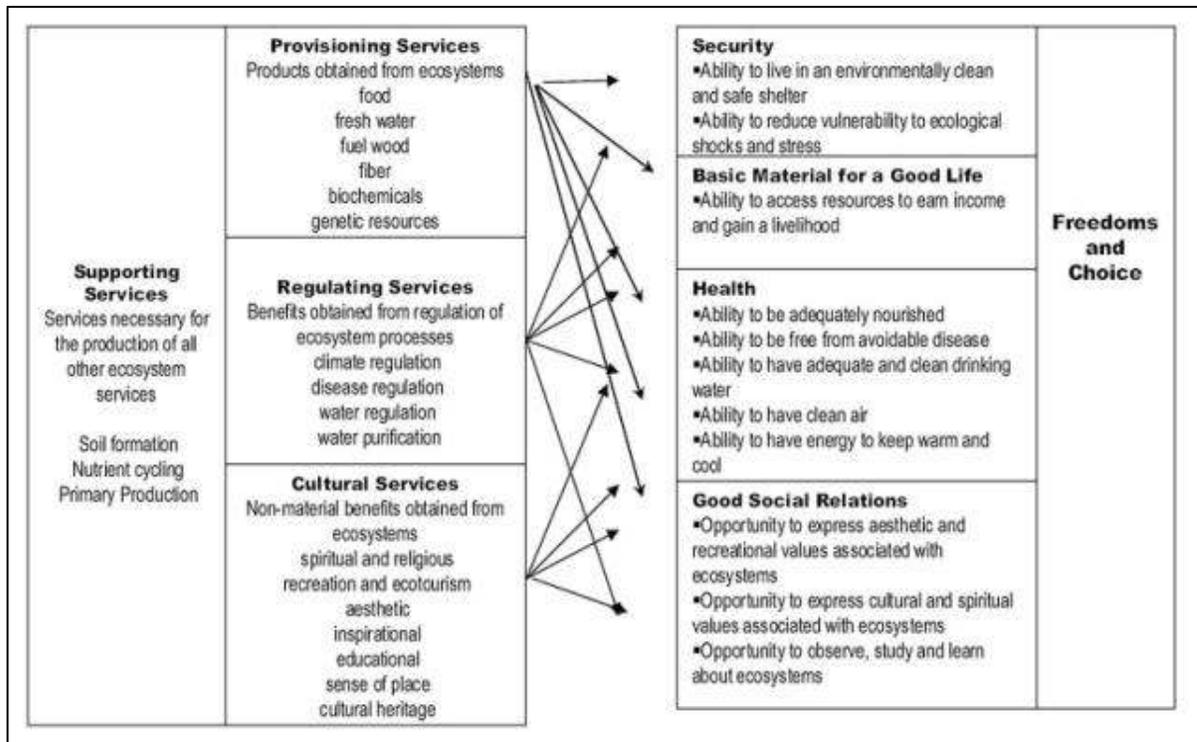


Figure 3.2 Ecosystem Services and their Links to Human Well-being (Millennium Ecosystem Assessment, 2003:5)

The concept of human security (related to concepts such as socio-ecological resilience and vulnerability) is concerned with safeguarding and expanding people’s vital freedoms, that is, it requires shielding people from acute threats as well as empowering them to take charge of their own lives, and is most evident in areas of human dependence on access to biodiversity and ecosystems (Costanza and Farley, 2007: 251; Hughes *et al.*, 2005: 380; Sonak and Shaw, 2006: 1).

Folke *et al.* (2002: 437) describe resilience of social-ecological systems as a combination of three characteristics:

- The magnitude of shock that the system can absorb and remain within a given state;
- The degree to which the system is capable of self-organization; and
- The degree to which the system can build capacity for learning and adaptation.

Furthermore, USAID (2008: 5) illustrates that community resilience requires integrating and maintaining an optimal balance between community development (provides the enabling governance and socio-economic and cultural conditions for resilience), disaster management (focuses on preparedness, response, recovery and mitigation to reduce human and structural losses from disaster events) and coastal management (establishes the environmental and natural resource conditions for resilience as well as addressing how to address the built environment). USAID (2008: 5) identifies specific benchmarks and elements to assess community resilience:

- Governance: Leadership, systems, and institutions provide enabling conditions for participatory management and community involvement with local government;
- Socio-Economic and Livelihood Assets: Local economies are driven by sustainable and diverse livelihoods and healthy and peaceful socio-cultural conditions;
- Coastal Resources Management: Active management of coastal resources sustains environmental services and livelihoods and reduces risks from coastal hazards;
- Land Use Management and Structural Design: Effective land use and structural design compliment environment, economic and community goals and reduce risks from coastal hazards;
- Risk Knowledge: Community is knowledgeable about episodic and chronic coastal hazards and measures to reduce risks;
- Warning and Evacuation: Community is capable of receiving notifications and alerts of coastal hazards, warning at-risk populations, and acting on alert;
- Emergency Response: Emergency response institutions and systems are established and maintained to respond quickly to coastal disasters and address emergency needs at the community level; and
- Disaster Recovery: Plans, systems, and institutions are in place to accelerate disaster recovery, actively engage communities in the recovery process and minimize negative environmental, social and economic impacts from disaster recovery.

These will be revisited in the conclusion to ascertain how resilient the KwaZulu-Natal north coast communities are in relation to these criteria.

Degradation of ecosystem goods and services is harming a large portion of the world's poorest and most vulnerable people (primarily in the developing world), and is sometimes the main factor causing poverty (Greenfacts, 2005). Poverty in turn tends to increase dependence on ecosystem goods and services, thereby intensifying pressure on ecosystems and a downward spiral of marginalization and ecosystem degradation (Greenfacts, 2005). According to Turner *et al.* (2003: 508), "the continuing conversion of natural ecosystems is usually undertaken for private benefits and even when locally captured these benefits often fail to filter down to subsistence users, thereby increasing poverty and inequality....this cost is in addition to the social costs incurred if ecosystem conservation strategies are not pursued".

The benefits that can be derived from coastal resources are well known and widely recognized (Costanza and Farley, 2007: 250; IUCN, 2007: 1-2; Wiethuchter, 2008: 6). Certainly in coastal zones of the world, biodiversity and ecosystems provide society with a flow of ecosystem goods and services which directly or indirectly contribute to basic life support services, supports economic production and consumption, and are required for society to function and grow (IUCN, 2007: 1; Martínez *et al.*, 2007: 255). For example, it is estimated that 90% of the world's fish production is dependent on the coastal areas at some time in their life cycle (Banica *et al.*, 2003: 9). Furthermore, some natural features of the shore zone provide significant coastal protection, including mangroves and coral reefs (McLean and Tsyban, 2001: 356); wetlands play a substantial role in wastewater purification and treatment (Galaz, *et al.*, 2008: 1); sand and gravel beaches function as wave energy sinks and barrier beaches act as natural breakwaters (McLean and Tsyban, 2001: 356); coastal dunes aid in retarding shoreline erosion by acting as natural buffers and sand warehouses, from which sand may be extracted during storms without major shoreline retreat; and coastal vegetation often absorbs wind or wave energy, retarding shoreline erosion (McLean and Tsyban, 2001: 356).

Coastal zones also offer a highly valued habitat to live as well as areas for recreation and tourism (Martínez, *et al.*, 2007: 261). Thus, ecosystem goods and services can be and are

classed as a combination of provisioning, regulating, supporting and cultural services, which directly affect people (MEA, 2003: 5).

### ***3.4.2 Ecosystems under pressure***

Virtually all of Earth's ecosystems have been significantly transformed in the last 50 years and today the fastest changes are taking place in developing countries (Greenfacts, 2005). Ecosystems are particularly affected by large-scale fishing, freshwater use and agriculture (Greenfacts, 2005). Humanity and its environmental impacts are preferentially concentrated in the coastal zones of the world. Anthropogenic pressures are increasingly threatening ecosystem functioning and stability. These, in turn, create additional uncertainty with respect to the inter-temporal guarantee in the provision of goods and services and in the defense against environmental change (Vergano and Nunes, 2006: 1).

A number of significant trends have become apparent worldwide: much of Asia, Africa, Europe, North America and parts of Latin America, are experiencing effects of chronic over-exploitation of their endemic coastal fish stocks (Creel, 2003: 1). It is estimated that, in 2007, about one-fifth of the stock groups monitored by the FAO were under-exploited (2%) or moderately exploited (18%) and could perhaps produce more, while 52% were fully exploited and, therefore, producing catches at or close to their maximum sustainable limits, with no room for further expansion (FAO, 2009: 30). The other 28% were either over-exploited (19%), depleted (8%) or recovering from depletion (1%) and, thus, yielding less than their maximum potential owing to excess fishing pressure in the past, with no possibilities in the short or medium-term of further expansion and with an increased risk of further declines and a need for rebuilding (FAO, 2009: 30). Most of the stocks of the top ten species, which account in total for about 30% of the world marine capture fisheries production in terms of quantity are fully exploited or overexploited and, therefore, cannot be expected to produce major increases in catches (FAO, 2009: 30).

Freshwater wetlands, which store water, reduce flooding, and provide specialized biodiversity habitats, have been reduced by as much as 50% worldwide (Burke *et al.*,

2001: 3). Sixty percent of worldwide coral reefs are threatened, with 80% in the Indian Ocean region the worst affected (Burke *et al.*, 2001: 3). Mangrove destruction has been rampant; the flows of most rivers have been interrupted by dams and the competition for fresh water flowing into the marine environment is intense (Curran *et al.*, 2002: 265).

“When studying the complex interactions between population dynamics and the ecosystem it is important to consider the functioning mechanisms of the full system and not single out one specific factor of change” (Curran *et al.*, 2002: 267). There are multiple actors and impacts operating in the coastal zone and their impacts on the geographical area or a specific ecosystem results in both off-site and cumulative impacts.

### **3.5. Drivers of biodiversity and ecosystem change in the coastal zone**

Coastal zones are currently experiencing intense and sustained ecological pressures from a range of extremely complex driving forces that are interacting across spatial, temporal and organizational scales, and thus requires intervention on a global scale (for example, to deal with climate change), regional (for example, to deal with fisheries) and local scale (for example, small catchment management) (Nelson *et al.*, 2006: 5; Degnbol *et al.*, 2003: 4). A driver is any stimulus, natural or human-induced factor, that directly or indirectly causes a change in biodiversity, whether positive or negative (MEA, 2003: 85). A direct driver explicitly manipulates ecosystem processes and can therefore be identified and quantified (for example, effluent seeping into the marine environment or rate and extent of land use change); while an indirect driver operates more diffusely, often by altering one or more direct drivers and its influence is established by understanding its effect on direct drivers (MEA, 2003: 85).

Changes in factors that indirectly affect ecosystems (Figure 3.3) such as population, economic activity, technology and lifestyle (upper right corner) can lead to changes in factors directly affecting ecosystems (for example, catch of fisheries, clearing land for urbanization or the application of fertilizers to increase food production) (lower right corner). The resulting changes in the ecosystem (lower left corner) causes the ecosystem

services to change and thereby affect human well-being. These interactions can take place at more than one scale and can cross scales. For example, global trends such as climate change or globalization can influence regional contexts of local ecosystem management such as changes in the export prices of cash crops can trigger land use changes at the local level (Nelson *et al.*, 2006: 5). Similarly, the interactions can take place across different time scales. Actions can be taken either to respond to negative changes or to enhance positive changes at almost all points in this framework (the red crossed bars in Figure 3.3) (MEA, 2003: 9).

The impacts of human actions on ecosystems are often slow to become apparent and hence ecosystems are managed in ways that benefit the short-term, while long-term costs go unnoticed or are ignored (Greenfacts, 2005: 5). This combination of time lag and absence of strategic thinking can transfer the costs of current changes to future generations, for example, some species might become extinct quickly when they lose their habitat, but for others, like trees, it can take centuries and these have resulting impacts on the humanity that rely on them to provide certain goods and services (Greenfacts, 2005: 5).

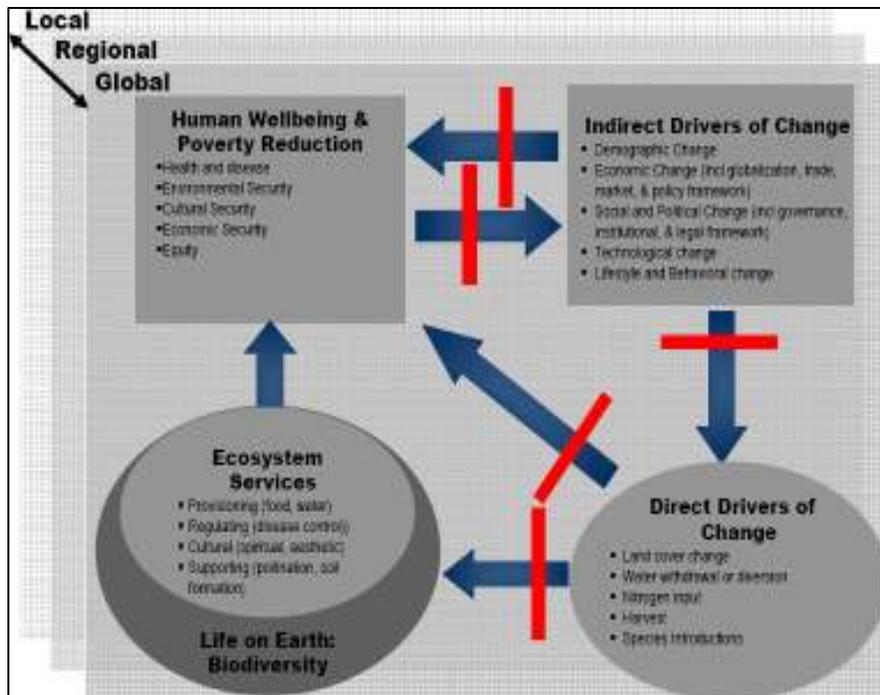


Figure 3.3 Drivers of Ecosystem Change (MEA, 2003: 9)

### 3.5.1 Direct drivers

According to the World Wildlife Fund (WWF, 2008: 4), the direct, anthropogenic threats to biodiversity globally are as follows:

- habitat loss and fragmentation;
- over-exploitation of species, especially due to fishing and hunting;
- pollution;
- the spread of invasive species or genes; and
- climate change.

All of these threats stem ultimately from human demands on the biosphere such as the production and consumption of natural resources for food and drink, energy or materials, and the disposal of associated waste products or the displacement of natural ecosystems by urbanization and infrastructure (World Wildlife Fund -WWF, 2008: 4). According to Nelson *et al.* (2006: 13), most direct drivers of degradation, are currently staying constant

or growing in intensity. These drivers were seen to be only partially under the control of decision-makers at the particular scales assessed (Nelson *et al.*, 2006: 2). Changes in ecosystems usually feed back to the drivers of change and hence these altered ecosystems create new opportunities and constraints on management with regard to aspects such as land use, resource quantity and quality, and social effects such as changes in income inequality (Nelson *et al.*, 2006: 6). Furthermore, these changes in ecosystems also create inequality in the distribution of the costs and benefits of such change implying that while some sectors are integrating smoothly into the global economic system and are capable of adapting to environmental change, others are becoming marginalized and vulnerable to environmental change or that this change is exacerbating existing inequities or creating new ones (O'Brien and Leichenko, 2003: 90).

### ***3.5.2 Indirect drivers***

To reiterate, Turner (undated cited in Nunneri *et al.*, 2004: 1), claims that coastal zones in particular face a range of interrelated pressures from globalization, in the form of increased demand for urbanization, industrial development and mass tourism. Population and economic growth, technological change and changes in socio-political institutions are key drivers of the massive increase in resource consumption. These drivers are generally fueled by market and intervention failures which range from pollution problems due to lack of market prices for the waste assimilation services provided by coastal waters, through over-use of some coastal resources because of open access, to resource damage caused by inappropriate incentive structures and uncoordinated policy measures (Bower and Turner, 1998: 42). This places severe pressure on the coastal zone resource base from the sheer scale of resource demands that are being created (Bower and Turner, 1998: 42).

## **3.6 Globalization and economic activity in coastal zones**

Globalization is characterized (either to a greater or lesser extent) by a range of general international exchanges and interdependencies between countries such as the removal of government imposed restrictions on movements between countries (resulting in

increasing trade liberalization and foreign direct investment), the expansion of capitalism and industrialization (increasing the competition between places), and the dissolution of territorial space boundaries, in effect thereby making the globe a single interconnected system (O'Brien and Leichenko, 2000: 226). This notion of one interconnected system plagues global environmental concerns as there is the growing recognition that ecological processes do not always respect national boundaries and that environmental problems often have impacts (both on global resources and global fairness) beyond borders; sometimes globally (Najam *et al.*, 2007: 1). Globalization, therefore, presents many challenges to sustainable development (Panayotou, 2000: 1; Najam *et al.*, 2007: 1), especially in coastal zones.

The coastal zones of the world are the domain of such global economic interaction for two explicit reasons, namely, the primacy of ports and related economic growth, and the connectivity in regional and global landscapes due to the medium of water (O'Brien and Leichenko, 2000: 230). The reasoning behind port activity has traditionally opened up coastlines to all forms of global interactions such as trade, tourism, economic activity and investment (Nunneri *et al.*, 2004: 11). The medium of water opens up the coastline to all forms of off-site and downstream impacts of pollution, erosion and other negative impacts emanating from such development. For example, the highly developed Turkish coastline is facing severe issues related to sewerage, wastewater and solid waste management due to the lack of adequate planning, financing and highly fragmented waste disposal policies (Burak *et al.*, 2004: 519). This has led to a spate of water quality issues such as the pollution of bathing waters that are exceeding standards relating to human health and environmental protection to the extent that international conventions related to marine pollution to which Turkey is a signatory urged their decision-makers to implement pollution prevention measures, especially with regard to trans-boundary issues (Burak *et al.*, 2004: 519).

Coastal zones are important economic zones which support livelihoods through “flows of income derived from the utilization of the *in situ* natural capital stock and through global trading networks” (Turner, 2004: 2). According to Creel (2003: 4), coastal zones attract a

high proportion of migrants searching for employment opportunities in coastal cities, however, many are without homes and proper sanitation, for example, almost half of the 12 million city dwellers in Mumbai are slum dwellers, with little access to sewage and sanitation facilities and currently 80% of this sewage is flowing untreated into the sea.

People in developed coastal areas rely heavily on infrastructure to obtain economic, social and cultural benefits from the sea and to ensure their safety against natural hazards and their well-being is supported by systems of infrastructure such as transportation facilities, energy supply systems, disaster prevention facilities, and resorts in coastal areas (Mclean and Tsyban, 2001: 365). The urbanization of coasts brings with it coastal development (including demands for fresh water and sewage treatment, roads, ports, bridges and buildings) which provide the foundations for coastal development (Creel, 2003: 2).

Many of the world's coasts have become committed to economic development. Economic measures strongly influence how trade-offs in coastal development are rationalized and decisions made over resources, and are important preferences in allocating funds, resources and lands (IUCN, 2007: 2). In most developing countries, the authority and the responsibility to manage such resources are not vested in local institutions but in distant governmental agencies and powerful private interests which results in 'winners' and 'losers' in allocation and use of resources (Olsen and Christie, 2000: 9).

Coastal over-development and urbanization continues rapidly in the northern Mediterranean, where nearly 90% of the coastlines are expected to become urbanized by 2050 (Coccossis *et al.*, 2002 cited in van der Knaap and Ivanov, 2005: 4). At present urbanization figures reach more than 70% for the seafront from Barcelona to Naples and few natural areas remain (UNEP, 1996 cited in van der Knaap and Ivanov, 2005: 4). In the developing world, the Indian Ocean countries (Kenya, Tanzania, Mozambique, including the islands of Comoros, Seychelles, Madagascar, Reunion and Mauritius)

provide other stark examples of countries with most of the major towns and cities located in the coastal strip (Turner *et al.*, 1995: 7).

Despite the complexity, coastal systems are mostly managed by agencies with single-resource or single-sector approaches, often acting independently. As noted by Cicin-Sain *et al.* (2000: 293), this management model of sectoral atomization is “a carryover from the time when ocean resources were viewed as unlimited and ocean uses as independent of one another”. In addition, management authority is shared by various administrative bodies whose territories of competence generally do not correspond to the ecological and human scales of the problems, leading to a geographical atomization, whose domains of action overlap (Bille and Mermet, 2002: 915). This breeds unsustainable, or at least greatly sub-optimal, development (Bille and Mermet, 2002: 915).

### **3.7 Global climate change and coastal zones**

Conflicts between human uses and environmental resources in coastal zones are causing negative perceptions of the human modifications in coastal environments (Trujillio *et al.*, 2003: 1). There is currently an unmitigated scientific and social opinion which considers that human environmental changes in coastal zones are damaging coastal resources (both natural and cultural), and that human influence is partly responsible for recent coastal environmental risks associated with global climate change (Trujillio *et al.*, 2003: 1). Continued rates of high population growth, increasing reliance on fossil fuel-driven growth technologies and land use effects (particularly urbanization, agriculture and deforestation) cause global climate change, largely due to increases in concentrations of green house gases, most notably atmospheric carbon dioxide (Vordzorgbe, 2007: 2). To the science community, and underscored by the Intergovernmental Panel on Climate Change (IPCC), this is evident from observations of increases in global average air and ocean temperatures, widespread melting of the northern hemisphere snow and ice and rising global average sea levels (IPCC, 2007: 2), with recognizable emerging parallels between global average surface temperature and global average sea level rise (Figure 3.4).

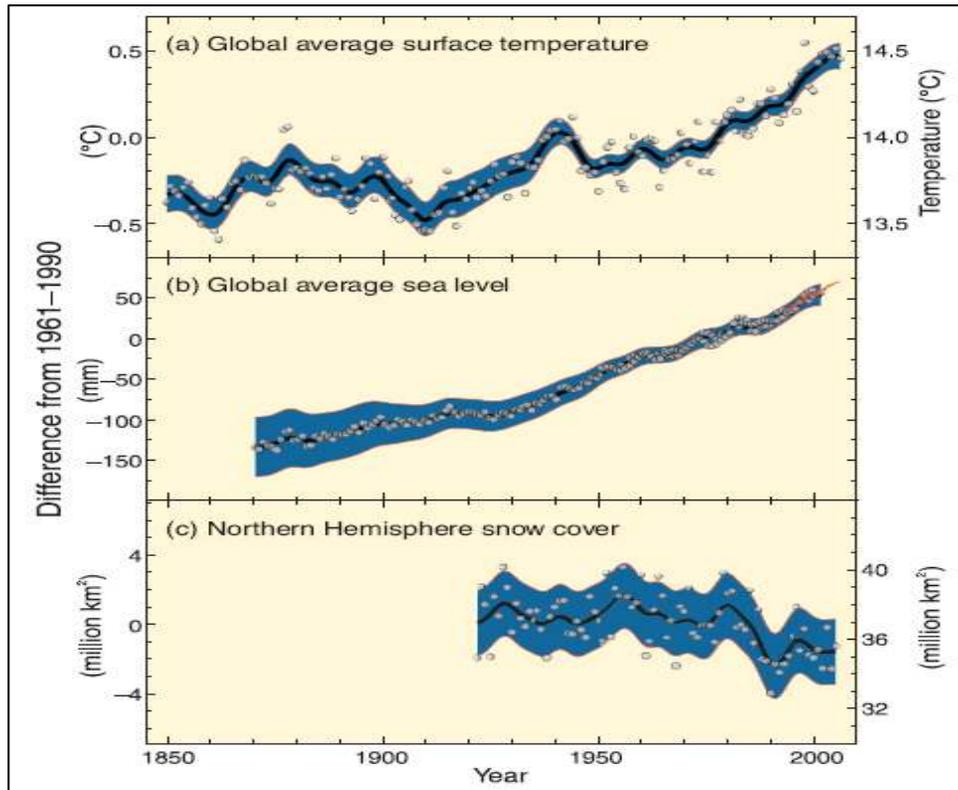


Figure 3.4 Changes in temperature, sea level rise and Northern Hemisphere snow cover (IPCC, 2007: 3)

The concentration of carbon dioxide in the Earth's atmosphere now exceeds 380 ppm, which is more than 80 ppm above the maximum values of the past 740 000 years (Weaver *et al.*, 2001; Key *et al.*, 2004 cited in Hoegh-Guldberg *et al.*, 2007: 1737). Furthermore, sea temperatures are warmer (+0.7°C), and pH (-0.1 pH units) and carbonate-ion concentrations (~210 mmol kg<sup>-1</sup>) lower than at any other time during the past 420 000 years (Hoegh-Guldberg *et al.*, 2007: 1737). Current concerns highlight interrogating the trends in such information. Crucial issues relate to the absolute amount of change, the rate at which change occurs and whether organisms and ecosystems (including humans) will be able to adapt or accommodate to the new conditions (Hoegh-Guldberg *et al.*, 2007: 1737).

To the rest of society, the manifestation of global climate change is witnessed in the increase in the frequency and intensity of natural disasters (cumulatively those associated with droughts, flood, windstorms, insect infestations, famines, earthquakes, wildfires, landslides, volcanoes and extreme temperatures) (Vordzorgbe, 2007: 2), accentuated by the recently devastating effects of the 2004 Asian tsunami and the 2005 Katrina event (Costanza and Farley, 2007: 249). In South Africa, the 2007 storm event which coincided with an equinox spring high tide resulted in 60-80 km/hour winds and 7-10 m waves which struck the KwaZulu-Natal coastline, causing large scale damage to property and infrastructure (DAEA, 2007: 1) (Plate 3.1). In the Pacific Ocean, the El Nino Southern Oscillation, which is a natural part of the Earth's climate, is expected to increase in frequency and intensity under conditions of global warming conditions, with anticipated stronger "cold events" (Timmermann *et al.*, 1999 cited in Mclean and Tsyban, 2001: 348).



Plate 3.1 Storm damage of the KwaZulu-Natal coastline, South Africa in 2007 (DAEA, 2007: 1)

Vordzorgbe (2007: 4), in the analysis of disaster events on the African continent for the period 1975-2002, indicates that the occurrence of natural disasters has shown a positive and increasing trend (Figure 3.5). Costanza and Farley (2007: 249) add another measure

of the reality of such events, that is, the huge impacts they are having on human lives lost, infrastructure destroyed, ecological damage and disruption to social networks.

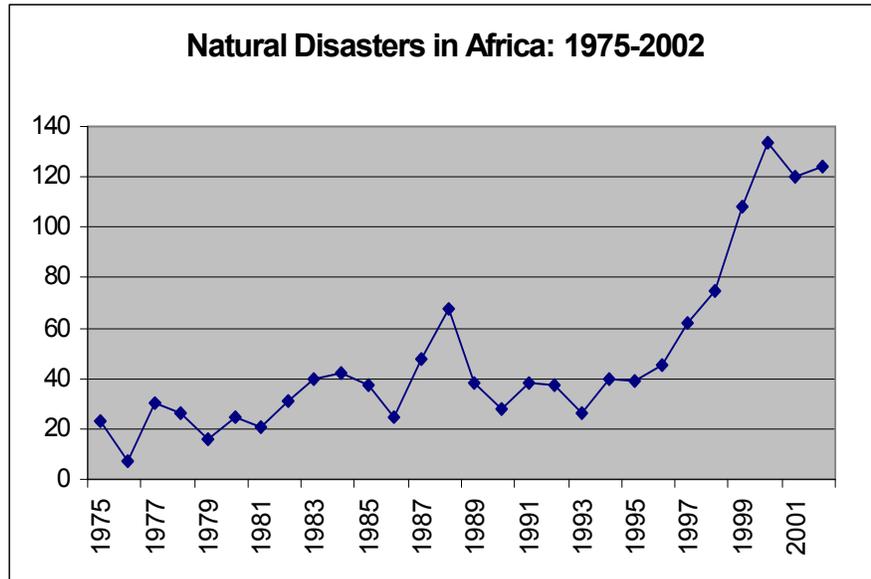


Figure 3.5 Natural disasters in Africa (EM-DAT: OFDA/CRED International Database adapted from Vordzorgbe, 2007: 4)

The major impacts of climate change are likely to encompass the following:

- An increase in drought, flood, windstorms and other extreme climate phenomena (locality specific) (Vordzorgbe, 2007: 4). This is expected to negatively affect water resources through reduced freshwater availability (due to wetland loss and increasing pollution of fresh water sources) and the increasing saltwater intrusion into coastal aquifers, food security, human health (such as spread of malaria), industrial production and weakened physical infrastructure base for socio-economic activity (Vordzorgbe, 2007: 4). According to Burke *et al.* (2001: 3), currently almost 40% of the world's population experience serious water shortages, with surface and groundwater sources in many parts of Asia, North Africa and North America rapidly becoming depleted;
- Global climate change is presently considered to be a significant driver of ecosystem change, affecting their structure, functioning and the goods and

- services they provide (Mclean and Tsyban, 2001: 345; Nelson *et al.*, 2006: 2). This is evident in, for example, the increase in reports of coral bleaching and coral diseases worldwide (Burke *et al.*, 2001: 6); and
- The large potential impacts of sea level rise on coastal societies, economics and ecology (where large concentrations of population and economic infrastructure exist) is expected to intensify already emerging problems such as loss of homes and property, threat to infrastructure and the erosion of the coast's natural defence systems (such as dunes). According to Hedlund and Mikkelsen (2004: 2), hundreds of coastal houses in the European Union (EU) have to be abandoned or lose value because of an imminent risk of falling into or being submerged by the sea. Furthermore, the estimate of the current total value of economic assets located within 500 m of the EU's coastline, including beaches, agricultural land and industrial facilities, is €500 to €1 000 billion and public expenditures to fight erosion are increasing (Hedlund and Mikkelsen, 2004: 2). Erosion makes natural sea defences vulnerable, for example, in 2001, part of the dunes on the Jurmala coast in the Gulf of Riga (Latvia) collapsed during a storm which resulted in the flooding of the hinterland (Hedlund and Mikkelsen, 2004: 2).

### ***3.7.1 Sea level rise and erosion***

Sea level rise does not cause erosion; rather, increased sea level enables high energy, short-period storm waves to attack further up the beach and transport sand offshore (Philip and Jones, 2006: 518). Central to the functioning of the coastal system are the interactions between relative sea level, which affects the stability of coastal forms and sediment abundance or deficit, which in turn results in either accretion or erosion (Hansom, 2001: 293). Coastlines are impacted upon and are in constant flux both eroding and accreting, from the routine and irregular forces and events associated with winds, waves, storms and tectonic processes (Burke *et al.*, 2001: 25), that is, erosion is a natural process. Sand taken away by waves and currents are naturally replenished by material that rivers transport from the catchment area or by sediment from eroding cliffs and from dunes. However, there can be many underlying factors that include shifts in the climate

and human impacts such as the construction of dams on rivers or building jetties along the shore that are resulting in severe coastal erosion or retreat (Komar, 2000: 3). Investigations of shoreline erosion, therefore, necessarily include a range in scales of processes and causes, both spatial and temporal (Komar, 2000: 3). The soft coastal landscapes of beaches, sand dunes and mudflats represent fast responding and mobile systems that are highly sensitive to environmental change, while coastal landscapes in areas of hard rock represent relatively slow responding systems which are more resilient to change (Hansom, 2001: 291). According to Mclean and Tsyban (2001: 357), approximately 70% of the world's sandy shorelines have retreated, about 20 to 30% have been stable, and less than 10% have been advancing, while the predicted sea level rise in coming decades makes general erosion of sandy shores more likely to be the norm. According to Cipriani *et al.* (2004 cited Philip and Jones, 2006: 517), generally there is a worldwide tendency towards coastal erosion. Beach erosion on island states is particularly acute, such as in Mauritius where beach erosion threatens coastal roads and tourist hotels and is likely to be compounded by accelerated sea-level rise resulting from global warming (Philip and Jones, 2006: 517). Sri Lanka is directly affected by sea level rise where beach erosion and coastal protection schemes have resulted in the loss of the recreational beach (Weerakkody, 1997 cited in Philip and Jones, 2006: 517).

The effects of coastal erosion differ across Europe, for example, where two thirds of the Belgian coast is composed of sandy beaches and the remaining third is sealed by construction and as a result, one quarter of the Belgian coastline is eroding, which is a high rate in comparison to other countries (Hedlund and Mikkelsen, 2004: 2). Italy also suffers from a chronic rate of erosion (23%), which is largely due to the rapid urbanization of its coasts and beaches (Hedlund and Mikkelsen, 2004: 2). On the other hand, the Finnish coastline is hardly affected because half of it is composed of hard rock which erodes very slowly (Hedlund and Mikkelsen, 2004: 2).

According to Burke *et al.* (2001: 25), natural systems are more adaptive to routine, irregular as well as long-term changes in the dynamic coastal system and the best way to take advantage of this invaluable service provided by beaches and other coastal habitats is

“to allow them the space to move in a seaward direction during accretionary phases and in a landward direction during erosional phases”. However, human response has been to strengthen the shoreline with artificial structures, which, while successful in protecting a particular aspect of the shoreline, also eliminates the natural response capacity of the system to regain equilibrium (Turner, 2000: 449; Burke *et al.*, 2001: 25). Phrased this way, it seems logical to deduce that humans have currently become the dominant geological agents on the world’s coastlines, perhaps suggesting that climate change is not the threat to beaches but rather development is (Cooper, 2009).

### ***3.7.2 Adapting to sea level rise***

Several studies suggested that shoreline protection structures such as seawalls, breakwaters and groins will become less functional because of sea level rise and may lose their stability (Costanza and Farley, 2007: 250; IUCN, 2007: 3; McLean and Tsyban, 2001: 356) thereby impacting on society occupying the space behind it. According to Cooper (2009), sea defences are largely ineffective (and costly) and once installed, lead to a succession of intervention. Carreno *et al.* (2008 cited in ICZM in the Mediterranean, 2008: 3) draws several advantages and drawbacks of different adaptation options to cope with the rise in sea level (Table 3.1).

Table 3.1 Advantages and drawbacks of different adaptation options to cope with the rise in sea level (Carreno *et al.*, 2008 adapted from ICZM in the Mediterranean, 2008: 3)

<b>Strategies</b>	<b>Advantages</b>	<b>Drawbacks</b>
<b>Protection</b> Freeze coast line (dikes, rock-amour) or deal with causes of erosion (breakwaters, jetties, re-depositing sand)	Efficiently solves local problems Very socially acceptable	High cost The phenomenon of erosion is simply moved to other sectors Disruption of sedimentological function
<b>Accommodation</b> (adjustment in natural or human systems to a new or changing environment) Adapt to the phenomenon by enacting construction regulations (zoning, raising foundations, etc.) and measures to compensate for property or systems destroyed	A gain of space and conservation of natural shore condition Local policy Low cost Compensation and extra cost of protecting shore are avoided	Local measures and not uniform Measures do not meet long-term imperative
<b>Strategic retreat</b> Move the objects threatened further inland	More efficient in the short and long-term No maintenance No impact on sedimentary function	A need for space inland and land where infrastructure and activities can be moved to Difficult to implement in zones where socio-economic interests are important or infrastructure and urbanization are extensive Not very socially acceptable
<b>Non-action</b> Decide not to take any action	Preserve natural functions	Implementation limited to natural areas where very little is at stake

However, protection structures persistently continue to line the wafer thin slice of coastline, hence the term ‘coastal squeeze’ (the confinement of the intertidal zone between sea defences and rising sea level) is increasingly being used (Turner, 2000: 449). In some of these cases, ecosystems can be completely lost, as they cannot migrate landwards (Banica *et al.*, 2003: 18). Cooper (2009) suggests that the coastlines of the world are increasingly becoming anthropic, due to the high level of human intervention

and he stresses that coastal change is a natural process and that beaches, without infrastructure is the best adaptation option.

### **3. 8 Coastal landscape change**

Urbanization is “a transformation process from a traditional agricultural society to a modern metropolitan society, associated with major changes in social and economic structures” (Liu *et al.*, 2005: 450). Land cover change is the conversion of the physical or biotic nature of a piece of land to an alternate use, while land use involves a change in use of land, which could also include changing land cover, hence the terms have often been used interchangeably (Gossling *et al.*, 2002: 284). Landscapes are a result of the unique interactions of natural and human processes and features at any location (Gulinck *et al.*, 2001: 260). Landscape change occurs when, either gradually or rapidly, the land cover transforms to a new dominant type, and also results in structural changes (Antrop, 2003 cited in Blaschke, 2005: 200). Land cover change is regarded as the single most important variable of global change affecting ecological systems, with an environmental impact as large as that associated with climate change (Sole *et al.*, 2004: 65; Southworth *et al.*, 2004: 186) and will undoubtedly continue to increase as the majority of the world’s populations are swarming into cities, especially coastal cities.

Burke *et al.* (2001: 3) present shocking evidence of the rate of transformation of land cover in world’s coastal zones (defined as all lands within 100 kilometers of the coast and excluding Antarctica and water bodies), where 19% of all coastal lands are classified as altered for either agricultural and/or urban uses; 10% are semi-altered, involving a mixture of natural and altered vegetation; and 71% fall within the least modified category (a large percentage of which occurs in the uninhabited areas in northern latitudes). This implies that probably more than half of the world’s coastal zones have been transformed as a result of human activities. Land use is absolutely essential for humanity, because they provide critical natural resources and ecosystem services such as food, fiber, shelter, and freshwater; however, some forms of land use are degrading the ecosystems and services upon which we depend.

The beauty of coastal ecosystems, their high accessibility and the multitude of services offered by these ecosystems makes the coasts a magnet for the world's human population (Martinez *et al.*, 2007: 261). Urbanization is recurrently mentioned as a major demographic driver (such as in the cases of the Caribbean Sea, Northern Range, Sinai, Portugal and Sao Paulo), with coastal urbanization identified as having a more significant impact on ecosystem change than in inland areas, suggesting that the global increase of urban regions in coastal areas is going to be a major driver of ecosystem change in the prospective future (Petschel-Held *et al.*, 2006: 148). Pena *et al.* (2005: 1) in their assessment of urbanization trends along the Spanish coastline identified the main change attractors as coastal proximity and water availability factors, as being responsible for the transformation from traditional land uses to new land uses with higher water demand and sea shore zones highly urbanized. According to Martinez *et al.* (2007: 267), in general, countries with high population densities on the coast had the lowest coastal ecosystem service product (highly degraded) values because of intense exploitation of coastal resources.

Urban development in many coastal regions has led to increased water pollution, shoreline modification and destruction and degradation of terrestrial and aquatic habitats and is closely associated with climate change (Conway, 2005: 877; Grimm *et al.*, 2008: 265; Pauchard *et al.*, 2006: 273). Increasing coastal populations, poorly planned development and short-sighted development policies are eliminating existing landscape protection and increasing the risk to lives and property from intense wind and waves (Bagstad *et al.*, 2007: 285). Land use globally is placing significant demands on fresh water availability and flow regimes, disrupting the surface water balance, runoff, and groundwater flow, increasing surface runoff and river discharge when natural vegetation (especially forest) is cleared (Foley *et al.*, 2005: 571). Water demands associated with land use practices currently directly affects freshwater supplies through water withdrawals and diversions and high consumptive use of water (not returned to the watershed) (Foley *et al.*, 2005: 571). Worldwide approximately 40% of the world's population, living in 80 countries, now face some level of water shortage (Gleick, 2000 cited in MEA, 2003: 79).

Some larger-scale environmental stresses heighten tensions, leading to possible conflict, for example, Ethiopia and the Sudan, which are both upstream of Egypt, increasingly need the Nile's water for their own crops, however, the construction of large dams for the benefit of irrigation and power generation is leading to displacement of people through flooding (World Commission on Dams, 2000 cited in MEA, 2003: 79).

Land use decisions in coastal areas are based on opportunities and constraints affected by both the biophysical and socio-economic drivers such as economic policy (which either act to enable or constrain conversions) (Conway, 2005: 879), property rights (Degnbol *et al.*, 2003:6), accessibility and land prices (Conway, 2005: 879) and the influence of local decision-making (Petschel-Held *et al.*, 2006: 152). Hence, there are many complexities associated with the multitude of complex driving forces of urbanization operating in and influencing the long-term management of natural resources in the coastal zone.

### ***3.8.1 Loss of agricultural land***

Agriculture is the mainstay of most economies, especially in relation to issues of food security. However, agricultural land is being converted mainly due to urbanization, industrial activities, tourism, and various competitive uses whose incomes are greater compared to agriculture. For example, on the Aegean and Mediterranean coasts one of the effects of tourism has been the transformation of agricultural lands into tourism areas because of its high revenue (Burak *et al.*, 2004: 523). As a result, farmers switched to intensive agricultural methods because the agricultural land has lessened which led to the over-use of fertilizers resulting in the pollution of soil and water resources (Burak *et al.*, 2004: 523).

China's economic reform and an open-door policy has resulted in rapid land use and land cover change across most of its territory to industrialization and urbanization which has resulted in the loss of a significant amount of agricultural land. The key drivers of this massive conversion was due to maximizing economic efficiency which is the top priority of development, while the general lack of appropriate land use planning and the measures

for sustainable development were secondary factors prompting this change in land use (Weng, 2002: 273).

According to Nelson *et al.* (2006: 6), land use and cover change is largely a local issue, and appears to be related to management activities (that is, land use change is controlled and influenced by changes in decision-makers' choices on how to manage local ecosystems and their services). Research on this process of local management concludes that traditional processes of land use regulation results in a 'growth machine' where property owners, developers, local businesses and politicians all share strong incentives to promote commercial and residential growth (Molotch, 1976 cited in Gerber and Phillips, 2004: 464) as it stimulates the economy, creates jobs, generates tax revenues, provides housing and increases the city's image. Therefore, the process of land use change is believed to have a strong pro-development bias.

### ***3.8.2. Landscape fragmentation in the coastal zone***

The spatial configuration of land use and land cover influences many important aspects of environmental quality, both natural and social and include aspects such as biodiversity (in particular, land use changes alter the patterns and processes of ecosystems) (Solé *et al.*, 2004: 65), which in turn alters how ecosystems interact with the atmosphere, with aquatic systems and with surrounding land (Vitousek *et al.*, 1997: 494), the health of rivers and estuaries, scenic quality and the extent of urban sprawl (Lewis and Plantinga, 2005: 3).

Many changes in the landscape, due to infrastructure projects and other developments, cause fragmentation of natural habitats resulting in habitat loss, isolation and often also degradation (Solé, *et al.*, 2004: 65). Habitat amount, quality and spatial organization affect genetic and species diversity (South West Ecological Surveys *et al.*, 2004: 14; Gontier *et al.*, 2006: 269). Habitat diversity describes the number and variety of habitats available within the landscape. Typically, landscapes with a large number and range of habitats usually support higher levels of species diversity than landscapes with fewer habitats, but this does not necessarily make them more important. Landscapes with low

habitat diversity can still have a critical role in conserving biodiversity (South West Ecological Surveys *et al.*, 2004: 14).

Where coastal ecosystems have been destroyed, degraded and/or converted in the course of expanding the built environment (and often poorly placed infrastructure), the impacts have been severe for society. Many of the processes that reduce biodiversity, for example, loss or isolation of habitats, operate at the ecosystem and landscape level (South West Ecological Surveys *et al.*, 2004: 14). The Convention on Biological Diversity advocates an 'ecosystem approach' to assessment of impacts on biodiversity which helps ensure that ecosystem processes that support biodiversity are understood and that ecosystem health and viability can be maintained for the benefit of biodiversity (South West Ecological Surveys *et al.*, 2004: 14). Robinson (1990 cited in Gulinck *et al.*, 2001: 260) reiterates that functionality (the value) of landscape systems is generally perceived as a scarcity and hence may be regarded as a threat, and so are the conflicts arising from competitive functions.

Another concern, particularly in coastal zones, is the cumulative impacts of linear development and infrastructure construction, such as roads and waterfront development. According to Treweek *et al.* (1998: 149), linear developments often affect large areas and impinge on a number of habitats, and can therefore have serious negative consequences for biodiversity. Residential and commercial construction may not only remove some native vegetation, it may also fragment the landscape into parcels that are too small to serve as viable habitats (Bagstad, 2007: 360). Where developments cross ecosystem boundaries, for example, affecting large areas of land or water, it may be necessary to consider impacts on biodiversity at the landscape scale (South West Ecological Surveys *et al.*, 2004: 14). Landscapes include overlapping or inter-related habitats for many different species thereby permitting movement and exchange of genes over considerable distances.

Social-economic factors such as land price, population density, access to employment offered in coastal areas and availability of services and an attractive lifestyle are

considered important motivating factors for large-scale land cover change (Conway, 2005: 879). For example, Conway (2005: 889) found that a large percentage of second homes in waterfront municipalities within the United States, high boat traffic in the estuary, and relationship between protected open space and land price in other areas of the Mid-Atlantic region indicate that water and protected open space are desirable neighborhood amenities. Furthermore, social policies such as spatial policies and space protection area policies are potential locating factors that either enable or constrain conversions to a given land use (Bockstael, 1996 cited in Bagstad, 2007: 285). Additionally, government tax, subsidy, and insurance policies can encourage or discourage particular forms of development (Bagstad, 2007: 285).

In the United States, for example, there is no consistent set of incentives or disincentives for coastal development, many programs have ambiguous or contradictory goals (such as local policies designed for local economic growth work against the goals of federal policy, thereby increasing flood damage risk while relying on federal aid once disaster does strike) or are highly fragmented (being administered by a variety of government agencies) (Bagstad, 2007: 285). In the case of coastal disaster protection, State and local governments can implement policies to improve the situation by preventing development in sensitive locations, but often fail to do so (Bagstad, 2007: 285).

Property rights, especially those held in private ownership, often have huge implications for landscape fragmentation effects where land use decisions are typically made at a finer scale than those at which environmental processes operate (landscape level) (Lewis and Plantinga, 2005: 3). The general lack of coordinated decisions obviates agreements on common goals in order to influence the spatial land use pattern and the environmental outcomes that depend on it which undermines a holistic landscape management approach (Bagstad, 2007: 360).

Furthermore, land owners must anticipate possible development on neighboring properties and understand how it may affect local resource management objectives and could lead to conflicts (Bagstad, 2007: 360). The notion of cumulative impacts is largely

unaccounted for as private ownership operates on distinct parcels of land and does not extend over the scale of an entire ecosystem. Cumulative impacts are defined as either repeated similar actions that affect the same biodiversity resource, numerous different actions that affect the same biodiversity resource within a certain area or timeframe or actions which take place that can reasonably be expected to lead directly to other, related actions (South West Ecological Surveys *et al.*, 2004: 51). Furthermore, land use regulation policies (such as zoning and ordinances and market-based instruments) provide mechanisms for influencing private incentives to achieve socially desired changes in the spatial configuration of land uses but are largely ineffective due to specifics on the limits to what is permitted on private owned land.

In light of the general negativity associated with landscape change, the case of property rights regime in Denmark's coastal zone poses a fresh alternative as it has no free exercise of property rights (Degnbol *et al.*, 2003: 6) thereby limiting the actions of a few. Intervention in property rights and the individual possibility for development is maintained to protect the landscape elements, biodiversity and public access to beaches (even if the visitors have to cross private property) (Degnbol *et al.*, 2003: 6). Furthermore, private property owners are not permitted to remove an access way without replacing it with another, and owners of a conserved area may not alter the landscape elements or construct new buildings (Degnbol *et al.*, 2003: 6).

### **3.9 Coastal and marine tourism**

Tourism is one of the fastest growing industries in the world and has become an essential aspect of global economic development (Maharaj *et al.*, 2008). The industry accounted for an estimated US\$3.5 trillion per annum and employed about 200 million people by the end of the twentieth century (Davenport and Davenport, 2006: 281), reflecting the phenomenal growth and earning potential of the industry in terms of economic growth and job creation. Tourist numbers are expected to double to 1.6 billion by the year 2020 (UNEP, 2005 cited in Cooper, 2007: 1).

This growth in tourism is reflective of the changing socio-economic profiles of the world's population translated as increased personal spending power and leisure time, a better informed and traveled (thus more discerning) tourists and major demographic changes (Davenport and Davenport, 2006: 280) in developing and more so in industrialized countries. Tourists from most European countries, for example, are characterized as older, frequent and more discerning travelers, who are perceptive to "green issues" and will therefore expect clean attractive environments (Perry, 2000: 7). According to Perry (2000: 8), this older segment, with wide spending power is also attracted to notions of purchasing second homes in favorable tourist destinations. Gossling (2002: 297) cautions, however, that with respect to tourism, increasing environmental consciousness, travel experience, the availability of more financial means for recreation, and more cosmopolitan understandings of the world may lead to more travel and thus increased resource use (Gossling, 2002).

Davenport and Davenport (2006: 280) allude to the advent of the modern phenomenon of mass tourism, stemming primarily from advances in technology and transport which has transformed tourism into a global pursuit, primarily with tourists from developed countries visiting almost all parts of the globe. Harriott (2002: 6) asserts that advances in transport technology may result in greater access by mass tourism operations to currently inaccessible regions, which has implications for future distribution and management of tourism impacts. The World Tourism Organization defines tourism as: "the activities of persons traveling to and staying, in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes" (Goeldner and Ritchie, 2006: 7). Mass tourism builds on this definition but emphasizes 'a specific region' for investment as a tourist destination (Cooper, 2007: 8). Certainly 'seasonality' shapes the choices made by this form of tourism, given that, for example, access to sea and sand is limited in the months of rain, and hence society organizes its production and consumption choices depending on the activity that is possible during the period (Noronha *et al.*, 2002: 4). Season and weather were found to be the most influencing characteristics of the intensity of beach tourism (Kammler and Schernewski, 2004: 124).

The numerical growth of the tourism sector adjunct with demands for higher quality experience and variation in tourism activities has spurred interests in what is often termed 'special interest tourism', broadly categorized as cultural, nature-based/ ecotourism, events, recreation (Fennell, 2003: 2), and education tourism used primarily in terms of the ecotourism concept (Luck, 2003: 994). Coastal and marine tourism is one of the fastest growing types within this category, with the unique combination of sun, sea and sand being the major draw card (Sasidharan *et al.*, 2002: 166; Creel, 2003: 3; Yepes and Medina, 2005: 83; Davenport and Davenport, 2006: 280). These types of 'special interest' tourism are promoted primarily on the appeal of their natural resources and landscapes and often built around sensitive ecosystems (Gossling, 2002: 201; Sasidharan *et al.*, 2002: 166).

The Mediterranean, for example, which is considered the main tourist destination in the world (De Stafano, 2004 cited in Cooper, 2007: 7), has also been identified by the World Wildlife Fund as one of the most important regions in the world in terms of unique biodiversity and a rich natural and cultural heritage (WWF, 2004 cited in Cooper, 2007: 8). Similarly, marine tourism in the Great Barrier Reef Marine Park is geographically focused on two major accessible reef areas (representing just 7% of the area of the Marine Park) where 85% of visitation occurs (Great Barrier Reef Marine Protected Area, 2000a cited in Harriott, 2002: 10). Cooper (2007: 2) cautions, however, that the seasonality of tourism, and the fact that popular destinations often coincide with environmentally sensitive areas, have resulted in some places becoming "victims of their own attraction".

According to Davenport and Davenport (2006: 280), while the benefits of the sea, sun and sand were the initial attraction to coastal areas, the availability of new destinations and more adventurous activities have brought new forms of tourist 'experiences' to the coast such as the desire to observe wildlife (birds, whales and corals). Increasing prosperity in developed countries has also created a worldwide demand for individual leisure transport, from simple walking and swimming to modern phenomena such as the use of off-road vehicles (ORVs), personal watercraft (PWCs), a spur in the cruise line

industry and scuba diving (Davenport and Davenport, 2006: 281). Perry (2000: 8) also adds the leisure pursuits of golf and marinas to this list. Many north African countries (Morocco, Tunisia and Egypt), Kenya and South Africa generate considerable tourism revenue from water-based recreational activities along their coastlines (Cave, 2003: 11).

Tourism theory has recognized the key importance of environmental quality for ensuring the competitiveness of most types of tourist destinations (Goeldner and Ritchie, 2006: 462). However, ecologically, the expansion of recreational and tourist activities may threaten undisturbed landscape and wilderness areas for short-term economic benefits (Simon *et al.*, 2004: 275). The coast thus provides a unique site for understanding the complexity of the linkages between social and natural systems (Noronha *et al.*, 2002: 4).

### ***3.9.1 Geographic zone of coastal tourism impacts***

The “coastal zone” is not a homogeneous, easily demarcated area and often includes a variety of geological and environmental systems which impact and react differently to stress caused by coastal tourism activities (Island Resources Foundation, 1996: 7). Several authors concur, however, that the geographic concentration of coastal tourism and its associated development impacts are strongly correlated with proximity to the littoral zone (near shore and offshore coastal waters and fringing reefs, beach and rocky shores, and backshore zones such as estuaries and dunes) (Cooper, 2007: 10; Noronha *et al.*, 2002: 15; Phillips and Jones, 2006: 518; Sárdá *et al.*, 2005: 428).

This concentration of development in the littoral zone has both direct and indirect impacts which are reflected in both tourism development and leisure pursuits. According to Cooper (2007: 3), the absence of adequate planning policies and regulations has resulted in tourist developments occurring in a spontaneous and short sighted manner, which bears no relationship to beach capacity or resource constraints such as water availability, sewage capacity and ecological capacity. Many ecological problems associated with tourism and leisure activities are created by excessive numbers of tourists (generating demand) combined with open access and perceptions of ‘rights’ to automatic access to

coastal areas, both terrestrial and aquatic (Davenport and Davenport, 2006: 290). The results are serious and/or irreversible ecological damage, to which the response, by developers, has been “to widen the area affected (to enter more pristine neighboring habitats), or simply to transfer activities to ‘more attractive’ areas elsewhere” (Davenport and Davenport, 2006: 290).

### ***3.9.2 Tourism land use change and impacts***

The use and conversion of lands is central to tourism. An often overlooked issue is that the area affected by tourism is often significantly greater than the directly built area and is often difficult to quantify (Gossling, 2002: 284). This includes not only accommodation, which is more obvious, but also insidious development such as supporting transport infrastructure (airports, parking areas, golf courses, marinas and second homes), additional lands needed for food production to supply hotels and restaurants, and waste disposal sites, which follows a chronology in the life cycle of the tourist industry (Gossling, 2002: 284).

However, cumulative, indirect and synergistic impacts are often not considered. For example, the rapid development of vacation homes and tourist related activities on St. John in the US Virgin Islands has led to severe erosion and increase in sedimentation in the marine environment, resulting in increased turbidity (Macdonald *et al.*, 1997: 851). The decline in marine water clarity has had profound impacts on the decline in the growth of offshore coral communities which are a primary attraction of St. John, and vital to maintaining both fisheries and the white sand beaches (Macdonald *et al.*, 1997: 851). According to Cooper (2007: 25), in the absence of strategic planning, large-scale tourism development has the potential to impact on social and amenity values within a community.

Tourism related development is taking a heavy toll on the natural beach ecosystems in many parts of the world, removing sandy spaces and beaches, destroying dune vegetation, reclaiming land and altering erosion and accretion phenomena (Noronha *et al.*, 2002: 15).

Primary dune destruction through human trampling and the use of off road vehicles on beaches easily disrupts the first pioneer phase of plant colonization which can result in sand blowouts, which may in turn smother some of the established communities further inland (Simon *et al.*, 2004: 276). According to Van der Meulen and Salman (1996 cited in Gossling, 2002: 287), almost 75% of Mediterranean coastal dunes have been damaged or destroyed since the mid-1960s, mainly as a result of tourism and in the case of small islands, tourism related land alteration may even be as high as 100% (for example, in the Maldives).

In the Mediterranean, coastal road construction, tourist resorts and car parks have replaced natural habitats like beaches with concrete and tarmac, while promenades and walkways often replace dune or rocky systems (Davenport and Davenport, 2006: 282). The ecological effects have been dramatic, resulting in the disappearance of wetland fauna and flora and habitat fragmentation which have reduced biodiversity, driving some vulnerable species such as the sea turtles close to extinction (Davenport and Davenport, 2006: 282). The cumulative implications of habitat fragmentation on turtle life history are particularly insightful. Marine turtles are threatened by tourism development in the area, mainly due to artificial lights from the tourist facilities at night and sand extraction occurring during the construction of beachfront hotels and sand compaction from intense beach use (Davenport, 1998 cited in Davenport and Davenport, 2006: 282).

### ***3.9.2.1 Beach loss in coastal areas***

Beaches are synonymous with tourism and current predictions of climate change and sea level rise coupled with impacts from tourist development have brought them under significant threat of erosion worldwide (Phillips and Jones, 2006: 517). Furthermore, these erosion processes are generating considerable short-term economic damage and are threatening environmental stability and the future economic value of coastal areas (Yepes and Medina, 2005: 86). Major contributing factors, as is evidenced by erosion rates along the Mediterranean coastline, are upstream activities (such as damming and gravel mining) affecting sediment budgets in addition to urban planning which favors the construction

of buildings in the littoral zone (Yepes and Medina, 2005: 86). Similarly, spectacular examples of continuing coastal development can be found in erosion prone locations on the Algarve coast of Portugal (Plate 3.2) (McKenna and Cooper, 2006: 421).



Plate 3.2 Tourism related development on eroding cliffs at Albufeira on the Algarve coast of Portugal (Backstrom, 2005 cited in McKenna and Cooper, 2006: 421)

### ***3.9.2.2 Water stresses in the coastal zone***

Tourism and water availability are another significant issue, often because tourists shift their water demand to other regions, often water scarce areas like coastal zones (Gossling, 2002: 284). Furthermore, they seem to use substantially more water on a per capita basis than at home, thus increasing global water demand, for example, the WWF (2000 cited in Gossling, 2002: 284) reports that the average tourist in Spain consumes 440 liters per day, a value that increases to 880 liters if swimming pools and golf courses exist, thus tourism may substantially increase the overall use of water in coastal areas (Gossling, 2002: 298). In the Mediterranean, every tourist consumes between 300 and 850 liters of water per day through waste, recreation and drinking water (De Stefano, 2004 cited in Cooper, 2007: 14). In certain cases, tourist peak seasons often do not coincide with corresponding water availability. For example, in Cyprus, tourism activity peaks in summer, coinciding with the time when natural water availability is at its lowest,

consequently results in the lowering levels of and increasing salinization in groundwater, which in turn cause habitats to disappear and have negative impacts on communities who rely on groundwater for consumption (De Stefano, 2004 cited in Cooper, 2007: 14).

Water quality issues in terms of organic and solid waste pollution, ranging from a multitude of land based and marine sources, in coastal zones are presenting particular stresses for tourism, both with dire long-term threats to human health, economic activities, biodiversity and recreational and tourism opportunities in many parts of the world (Chia, 2000: 1). On the land side, infrastructure investment mainly in pollution prevention issues, such as sewerage, wastewater and solid waste management, has fallen behind schedule due to the lack of adequate planning, legislation and financing (Burak *et al.*, 2004: 519), resulting in pollution of groundwater, water courses and coastal waters from untreated sewer and other contaminants. This situation certainly applies to large tourist centers in the East Asian region, for example, such as areas in Phuket, Malaysia and Bali where the serious inadequacy of sanitation and wastewater treatment facilities has had devastating pollution impacts on the coastal environment and consequently on tourism (Chia, 2000: 13). Sanitation problems are exacerbated by inadequate freshwater supply and wastewater treatment infrastructure, as well as some hotels being built along the beach and operating on septic tanks with resulting direct discharges or untreated sewer into the sea (Chia, 2000: 13). Gossling (2002: 284), argues that the property boom in coastal areas and tourism development place urgent demands and expectations of service provision and will require significant government expenditure, which is often not available. The seasonality of the nature of tourism is another limiting factor regarding whether expenditure will be committed to an activity that only occurs in a certain portion of the year.

On the marine side, leisure activities such as cruise ship operations create a number of ecological problems due to illegal discharge of substances (mainly oil or other hydrocarbons) and substantial quantities of garbage, wastewater and sewage that are often discharged untreated into pristine marine habitats (Davenport and Davenport, 2006: 282). Furthermore, cruise ship anchoring in tropical waters has been associated with

severe long-term damage to coral reefs, while dredging channels for the larger vessels causes increased turbidity that is damaging to both corals and seagrass beds (Davenport and Davenport, 2006: 282).

### ***3.9.3 Marine ecotourism***

Fennell (2003:21) states that ecotourism falls largely within the ambit of nature-based tourism, which includes the use of natural resource including beachscapes and landscapes. However, ecotourism is increasingly becoming linked with educative components, sustainability, values and ethics, conservation and livelihoods (Fennell, 2003: 21; Luck, 2003: 944; Garrod and Wilson, 2004: 97). “Much, off course, depends on whether (marine) ecotourism is developed in ways that are fully consistent with the principles of sustainable development” (Garrod and Wilson, 2004: 105), so there are obvious management implications.

Marine ecotourism can be defined as “ecotourism that takes place in marine and coastal environments” (Garrod and Wilson, 2004: 95). According to Garrod and Wilson (2004: 95), marine ecotourism activities typically occur in places which could be considered ‘peripheral’ in spatial, temporal and/or economic terms, since many of the objects of marine ecotourism owe their continued existence to the relative remoteness of ecotourism destinations, which has to some extent protected them in the past. Fennell (2003: 29), however, highlights the advent of the concept of adventure tourism or special interest tourism, which according to some viewpoints subsumes ecotourism. The activities classed under marine ecotourism therefore can range from and include pursuits such as wildlife viewing (whale and dolphin watching), scuba diving, water sports, ORVs and eco-resorts, often blurring any distinction between them.

Ecologically, the increasing number and diversity of experiences for a consumer-based society pose significant threats to previously remote areas (Fennell, 2003: 66). Hence, even though environmental knowledge may increase among tourists, personal behavior may be characterized by increased resource consumption (Gossling, 2002: 296). The

environmental indicators and criteria used in several initiatives such as eco-labeling schemes, environmental certification and awards, Blue Flag status and environmental quality indices are currently being utilized by the tourism industry as managerial tools for the quality and competitiveness of the tourism product (Kuvan, 2005: 264). However, according to Garrod and Wilson (2004: 105), there are many instances of tourism products, marketed as ‘ecotourism’ that have fallen short in meeting the high standards set for ecotourism by its advocates, resulting in a “counterfeit form of ecotourism that prospers on the good intentions of tourists but fails to bring about genuinely sustainable outcomes”.

### ***3.9.3.1 Eco-developments***

A case in point is demonstrated by Pleurom (2007: 1) who argues that “many developers and tourism promoters nowadays simply declare golf resorts as ‘ecotourism’ projects so that hitherto undeveloped nature-based destinations and even protected areas are no longer safe from golf course construction. In fact, the development of ‘sustainable’ or ‘eco’ golf tourism in environmentally vulnerable areas often entails massive ‘ecoterrorism’” (Pleurom, 2007: 1). The National Golf Foundation of the USA estimates that there are 31.5 million golfers in North America, 1.4 million in Japan and approximately 2.3 million golfers in Europe (TKZN, 2005b: 2). Additionally, Florida in the United States, receives 1.5 million golfers annually, while golf tours to Scotland contribute £300 million annually to the economy (TKZNb, 2005: 2). Furthermore, it was found that the golf visitor to Scotland spends double the amount of any other visitor in terms of tourism to that country (TKZN, 2005b: 2). It is therefore clear that golf tourism is a rapidly growing international phenomenon.

As one of the most rapidly expanding types of extensive land use, golf course development has often attracted controversy when proposed as a policy to promote special interest tourism, especially in areas with limited water, energy capacity and land availability (Markwick, 2000: 515). This is evidenced in the continuing growth of luxury residential and resort development around the world that accompanies golf tourism,

where architects are increasingly trying to top each other with elaborate layouts and spectacular water elements to lure homebuyers to international projects (Brass, 2007: 3). In terms of land consumption, Kuvan (2005: 269) estimates the average sizes of these areas from between 825 000 to 1 264 400 m<sup>2</sup>.

As emphasized by Tosun (2001 cited in Kuvan, 2005: 266), the objective of most eco-type resort development is also driven by not only the need of the country, but also by domestic and foreign business interests. These often cause conflicts over foreign interests predominating over wider local issues such as preserving cultural heritage, environment, local participation, and fair and balanced distribution of the benefits from tourism (Kuvan, 2005: 266). According to Warnken *et al.* (2005: 367), some eco-resorts fail to achieve above average standards with respect to the dimensions of environmental performance, especially in terms of energy and water consumption. Furthermore, consumption rates are influenced by a multitude of site specific characteristics such as age of building, building size and layout, nature of operation and facilities (particularly golf courses and swimming pools) (Warnken *et al.*, 2005: 367).

Increasing the physical capacity of the ecotourism industry such as golf courses has resulted in encouraging rapid tourism growth at an unsustainable rate, for example, increasing the demand for the use of forested lands and forested dune cordons within coastal areas for tourism (Kuvan, 2005: 269) thereby replacing indigenous vegetation. The Global Anti-Golf Movement (GAGM), which has researched the multidimensional problems related to golf and engaged in many campaigns against controversial projects worldwide, highlights local protests against these types of development from all over the world (Pleurom, 2007: 1). Their studies reveal that golf course construction devours vast stretches of land and causes a whole range of serious problems, such as deforestation, waste of scarce water resources to keep the turf green, contamination resulting from the excessive application of chemical fertilizers and pesticides for the maintenance of the courses, as well as the disruption of rural lifestyles and even forceful eviction of villagers.

### **3.9.4 Marine tourism management**

Land use change and land cover change are considered the most important issues among the negative environmental impacts of tourism, since they also contribute to many environmental problems which in turn affect ecological systems (Kuvan, 2005: 271). Coastal zones which are magnets for all forms of tourism activities and infrastructure investment, as well as unique biodiversity on which it depends, present particularly useful sites for addressing cumulative impacts of development (Harriott, 2002: 23). In this context, integrated land use planning, by establishing coordination and cooperation among the public bodies, and between the public and the private sector would be an important step in solving land use conflicts, particularly between developers and conservation (Kuvan, 2005: 271). As Harriott (2002: 23) argues, in the absence of strategic planning, large-scale tourism development has the potential to impact negatively on social and amenity values within coastal landscapes.

According to Simon *et al.* (2004: 276), the basic aims of planning and management of tourist and recreational natural areas should be:

- To obtain and maintain public access;
- To improve tourists' perceptions obtained through a visit;
- To protect the site; and
- To make recreation compatible with other interests.

### **3.10 Sustainable development in the coastal zone**

“Nowhere is the concept of sustainable development more challenged in its conceptualization and implementation than in the coastal zones of the world” (Olsen, 2000: 332). The dire situation in the world's coastal zones is summed up in the following statement by Dr. Alfred M. Duda (Senior Advisor, International Waters, Global Environment Facility):

*Many coastal communities and nations are simply living on borrowed time before the \$60 billion dollar annual international trade in fisheries collapses, depleted groundwater supplies for coastal cities run dry, changing climate swamps coastal communities, and burgeoning coastal urban populations overwhelm their degraded and polluted natural resource base.*

(UNESCO, 2006: 2)

Thus, sustainable development in the world's coastal zones will require replacing the current imperative of growth (consumption and population) with types and intensities of human activity that are in long-term balance with a finite planet (Olsen, 2000: 332). The management of the world's coastal and marine resources was firmly placed on the international agenda by the United Nations Conference on Environment and Development (UNCED) conference in Rio in 1992 (Agenda 21 chapter 17 on oceans and coasts) (Bennett, 2001: 1). This Chapter stresses the importance of the coasts and oceans in the global life support system (Isager, 2008:7). Agenda 21, Paragraphs 17.6 (b) states:

*Each coastal State should consider establishing, or where necessary strengthening, appropriate coordinating mechanisms (such as a high-level policy planning body) for integrated management and sustainable development of coastal and marine areas and their resources, at both the local and national levels. Such mechanisms should include consultation, as appropriate, with the academic and private sectors, non-governmental organizations, local communities, resource user groups, and indigenous people.*

(United Nations, 1992: 3)

Stojanovic and Ballinger (2009: 49) assert that the effectiveness of institutional arrangements and policies for governance has become a key question within the sustainability paradigm, including coastal areas which have unique issues and jurisdictions across the land-sea interface. Considerations of sustainability usually take a long-term (50+ years) outlook, require a holistic and integrated view, need to consider different societal domains (social, ecological and economic) and at different levels (global to local) (Rotmans *et al.*, 2001 cited in LOICZ, 2001: 37). "Any specification of

this demand is highly controversial, and requires policies which translate sustainability into effective political programs and instruments” (Osthorst and Lange, 2007: 2). Furthermore, according to Xiuwan (2000: 107), policy and decision-making in the context of sustainable development requires rapid, effective and efficient access to and integration of appropriate current information from a wide range of sources and disciplines, including spatial information (such as land cover change) which can demonstrate the potential in monitoring progress towards sustainable development. With regard to coastal and marine areas, ICZM has been discussed as one possible governance concept because it integrates the various conflicting societal interests, the long-term preservation and protection of the coastal ecosystems and its focus on policy integration, inclusion and participation (Osthorst and Lange, 2007: 2).

Agenda 21, the hallmark agreement advocating the integrated management of oceans and coasts (Chapter 17) with the aim of achieving sustainable development, set the precedent for which many other international agreements would follow. The most influential of these are as follows:

- Convention on Biological Diversity (2000: 6), Art. 6(b): “Integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programs and policies”;
- Framework Convention on Climate Change under which the International Panel on Climate Change (IPCC, 2007: 12) concluded that successful adaptation to the threat of sea level rise requires that efforts at vulnerability reduction be undertaken within the context of ICZM;
- Barbados Program of Action (1994: 17), Paragraph 23(a): “Apply integrated coastal area management approaches, including provision to involve stakeholders, in particular local authorities and communities and relevant social and economic sectors”. Paragraph 26.A(i): “Establish and/or strengthen, where appropriate, institutional, administrative and legislative arrangements for developing and implementing ICZM plans and strategies for coastal watersheds and exclusive economic zones, including integrating them within national development plans”;

- Global Program of Action (GPA) for the Protection of the Marine Environment from Land Based Activities (UNEP, 1995: 10), Paragraph 19: “States should, in accordance with their policies, priorities and resources, develop or review national programs of action within a few years and take forward action to implement these programs...should focus on sustainable, pragmatic and integrated environmental management approaches and processes, such as integrated coastal area management”; and
- The Plan of Implementation for the World Summit on Sustainable Development (United Nations Division for Sustainable Development, 2005: 16), Paragraph 29(e): “Promote integrated, multidisciplinary and multi-sectoral coastal and ocean management at the national level, and encourage and assist coastal States in developing ocean policies and mechanisms on integrated coastal management”.

The ICZM concept was further detailed by the development of a suite of international guidelines (in the 1990s) such as those of the Organization for Economic Cooperation and Development (OECD), the World Bank and the United Nations Environment Program (Bille and Mermet, 2002: 915). Several academic publications also ensued such as those by Post and Lundin and Clark, whose 1997 guidelines in ‘Coastal zone management for the new century was quite prominent (Bille and Mermet, 2002: 915). Also, ICZM programs which identify national priorities were generally sponsored by development organizations such as the World Bank or USAID (DEAT, 2000a). These international influences represent a consensus on some basic points regarding ICZM.

These relate to the coast being viewed as a distinct special area compared to other areas and hence needs special management (Banica *et al.*, 2003: 28). Furthermore, other key points include the purpose of ‘integration’ which is to optimize relationships between coastal uses and the protection of the coastal ecosystem; and a normative approach to ICZM with an agreed acceptance of the sustainable development principle as a cornerstone within all national and international policies (Banica *et al.*, 2003: 28). Governments, through various regional and international processes and conventions, have

committed themselves to the implementation of ICZM as an effective mechanism for addressing and resolving the multiplicity of issues experienced in coastal areas (Francis and Torell, 2004: 301).

While governments have expressed official commitment to the pursuit of sustainability, effective action on these commitments has been limited, and the dearth of systematic and comprehensive evaluation of the sustainability implications of public policy remains rare (Stinchcombe and Gibson, 2001: 334). “Nowhere is this more evident, or more discouraging, than at the core of governmental practice in the making of public policies, plans and programs” (Stinchcombe and Gibson, 2001: 334).

### ***3.10.1 The need for integrated coastal zone management (ICZM)***

The extent of the coastal zone is defined by the area in which terrestrial and marine processes (economic, ecological and socio-cultural) depend on and influence each other (Lourenco and Machado, 2007: 2). Furthermore, coastal zones play a significant role in socio-economic development and ecological importance in terms of, for example, biodiversity and ecosystem goods and services which they provide as well as the protection against erosion (Coztanza and Farley, 2007: 250).

Rodriguez *et al.* (2009: 100) state that ICZM attempts to define the sustainable management of the littoral zone considering two factors:

- it needs a deep knowledge of the physical environment as well as the relationship between the agents and processes of each one of the fields involved (marine, coastal and terrestrial); and
- it needs an appropriate territory management.

They indicate that these factors are, in turn, conditioned by the legal, social and environmental aspects that are established by public, national and local administrations.

Water circulation is the key integrating phenomenon which links the different problems with strong dynamic interrelations (Bille and Mermet, 2002: 915). Banica *et al.* (2003:

22) emphasize the adoption of a systemic view of coastal zones (that the natural processes of the coastal zone are also being affected by activities far from the coastal zone itself), thereby highlighting the importance of integration of coastal management with the management of other economic sectors, the integration across the terrestrial-marine interface, as well as the integration at the international level in respect of trans-boundary issues.

Despite the complexity, coastal systems are mostly managed by single-resource or single-sector approaches, often acting independently (Bille and Mermet, 2002: 915), and generally dealt with by “site specific issues” examining small areas or focusing on individual issues (Shi and Singh, 2003: 145). According to Banica *et al.* (2003: 22), the notion of ‘integration’ can also be given a sound economic rationale, particularly when considering the externalities bound in the coastal areas. For example, there is little incentive for farmers to consider the impacts of agricultural activities on water quality, or for those involved in aquaculture the impact of it on tourism, so there is first an economic justification for an integrated management of the interactions between competing activities and a secondary need for balancing the interests of the different stakeholders in the coastal areas (Banica *et al.*, 2003: 22). In addition, management authority is shared by various administrative organs in coastal zones with varying knowledge and competencies which often do not correspond to the ecological and human dimensions of the problems, resulting in “geographical atomization, and overlapping jurisdictions in management which lead to sub-optimal development or unsustainability” (Bille and Mermet, 2002: 915).

Zagonari (2008: 796) adopts an approach which centralizes community involvement in ICZM, referred to as integrated community-based coastal management. These initiatives are particularly significant in improving coastal quality in situations where there is a low degree of interest in maintaining the coastal use over time (Zagonari, 2008: 796). In cases where “the interest is high, an integrated community-based approach is preferred if the willingness to pay for coastal improvements is great and the marginal inefficiency of investments in coastal improvements is low, because coastal quality improves to a greater

extent; if not, only an integrated top-down approach to coastal management will increase the coastal quality” (Zagonari, 2008: 796). In contrasting approaches, Zagonari (2008: 796) suggests that developing countries adopt a community-based approach; whereas developed countries should adopt a community-based approach where local stakeholders attach direct values to the coastal quality, and adopt a top-down approach where the general population attaches indirect (option or existence) values to coastal quality.

Another facet of integration is the need for cross-disciplinary communication and development of analytical tools to interact with and intervene in a complex context, such as the coastal zone (Boulding, 2004: 127), in order to base coastal management policies on more informed and effective decisions. This requires the combination of diverse and specific knowledge of both environmental and human processes as well as new approaches to scientific work, capable of overcoming disciplinary boundaries between scientific fields, and improve the knowledge integration in ICZM (Trujillo *et al.*, 2003: 1), as discussed in the previous chapter. To this end, integration has to bring both development planning agencies and environmental agencies to a collaborative consensus on management. Lawrence (2000: 607) argues that urban and regional planning theory, which has largely operated along the lines of ‘master planning’ (rationalism) and the theory and practice of management tools such as EIA (ecological rationality) have largely proceeded along parallel but separate paths, and both have the ability to learn from each other through collaborative dialogue.

Subsequent to WSSD, UNEP has embarked on an important initiative to promote integrated assessment and planning for development in an attempt to build on current thinking and best practice regarding integrated assessment and to link it more closely to all key decision points in the development process through promotion of a framework for Strategic Integrated Planning for Sustainable Development (Abaza *et al.*, 2004: 3). Thus, the need for an integrated and comprehensive approach to impact assessment and development planning has never been greater (Abaza *et al.*, 2004: 3).

The design of international monitoring and assessment protocols, such as the Global Ocean Observing System (GOOS), the Global International Waters Assessment (GIWA), and, more recently, the Global Terrestrial Observing System (GTOS) and the MEA has provided an opportunity for more integrated and systemic reflection (Bowen and Riley, 2003: 300). These initiatives provide appropriate frameworks for the articulation of changes in the condition of natural systems which have a direct impact on the ecosystemic functions that humans depend on for health, services, and economic growth (Bowen and Riley, 2003: 301).

### **3.11. Integrated Coastal Zone Management (ICZM)**

ICZM has been discussed in this study thus far, given that it is a key aspect of this research. This section highlights some of the issues raised and examines some additional concerns. Ahmed (2006: 34) states that integrated coastal zone management (ICZM) is increasingly an accepted management framework to address coastal and marine environmental problems, conflicts and management needs which is aimed at achieving sustainable use of coastal resources. ICZM was borne out of the need to reconcile the conflict between environment and development in the coastal zone and was first enacted in the United States in 1970, in the Federal Coastal Zone Management Act of 1972 (Banica *et al.*, 2003: 34). As indicated previously ICZM had numerous definitions and aims. For example, Shi *et al.* (2001: 417) defines ICZM according to the following aims and key aspects:

*The aim of ICZM is to promote the sustainable use of the coastal zone by balancing demands on its natural resources with the economic, cultural and social needs of the area and by seeking to resolve conflicts of use, having regard to the needs of present and future generation.*

(Shi *et al.*, 2001: 417)

ICZM varies depending on context; however, central to its goals has been a focus on encouraging sustainable coastal resource use through an iterative process of regulation and policy development, institutional coordination and education (Christie, 2005: 208).

Olsen and Christie (2000: 12) highlight that ICZM “does not replace traditional sector-by-sector management, but rather provides for an additional dimension to the governance process by examining and acting upon the interactions and interdependencies among human activities, and the ecosystem processes that link coastal lands with the coastal ocean”. ICZM is the overarching coordinating body that aims to reconcile the various issues that occur in coastal zones. These issues are similar across a wide range of societal and geographic settings and broadly incorporate the following (Noronha, 2004: 63; Olsen and Christie, 2000: 7):

- The degradation and loss of essential coastal ecosystems (wetlands, coral reefs, dunes and estuaries) and the resulting loss of biological diversity, particularly biodiversity patterns and processes;
- The decline of estuarine-dependent fish and shellfish populations and their associated long-term impacts on commercial fisheries;
- Declining near shore water quality and changes to the volume, quality, and pulsing of freshwater inflows to estuaries and the near shore marine environment;
- The inappropriate siting of shoreline protection and other infrastructure and their subsequent high vulnerability to the impacts of floods, storms, and erosion/accretion processes, and their impacts on society; and
- Equitable distribution and sustainable management of common resources and unrestricted access for traditional users and the public to the shore, wetlands, and fishing grounds.

Furthermore, the ICZM program must include all three closely interdependent geographic components: coastal waters, coastline and coastlands (McCreary *et al.*, 2001: 2) as it is difficult to deal with each in isolation of the others, hence the integration concept can be related to three dimensions:

- A spatial or geographical dimension, which implies that terrestrial and marine areas and the development of these are to be seen in conjunction with one another, and that coordination between geographical and administrative units takes place over large areas of the coast;

- Horizontal or cross-sectoral integration, which is the coordination and conflict resolution between sectoral interests at the same administrative level; and
- Vertical integration, which is the integration between the levels of government and NGOs, and stakeholders whose actions significantly influence the quantity and quality of coastal resources and environments, as well as the harmonization of policy and action between agencies at different levels in the management hierarchy.

ICZM therefore “unites in one complex ‘general system’ government and community, science and planning, sectoral and public interests by promoting and implementing an integrated plan for the protection and development of coastal systems and resources” (Banica *et al.*, 2003: 34). Laine and Kronholm (2005) support this position stating: “The Integrated Management System binds together coastal areas that share similar natural conditions and human impacts and are physically connected through a common sea basin”. They underscore the importance of participatory approaches and meaningful stakeholder participation in their assessment of Bothnian Bay in Europe.

### ***3.11.1 The ICZM process***

ICZM programs often consider “a coastal geographic unit or ecosystem with the people of the place to create a ‘vision for its future’; then motivate and catalyze action among stakeholders to achieve that future” (Hale *et al.*, 1998: 6). ICZM is therefore generally appreciated as a process for negotiating and implementing public policy to achieve sustainable coastal development goals (these being improvements in the bio-physical environment as well as improvements in the quality of life of coastal communities) (Olsen, 2003: 348). Christie (2005: 211) draws an important distinction between ‘ICZM projects’ and ‘ICZM processes’, where projects are defined as a collection of activities supported by external funding (and have a predetermined end point, frequently based on availability of funding), while the general intent of most ICZM projects is to start iterative ICZM processes that continue beyond project termination.

The process of ICZM covers the full cycle of information collection, design of planning, decision-making, management and implementation (Banica *et al.*, 2003: 35; Olsen, 2003: 384; Gremmenas 2005: 27). Furthermore, it is also iterative, as dynamic systems are in continuous need of review and adaptation to new conditions, so that the cycle has to be started once again, which is in keeping with the notion of the systemic view of the dynamic coastal processes (Olsen and Christie, 2000: 10; Banica *et al.*, 2003: 35) (Figure 3.5).

Figure 3.5 depicts the typical steps in the ICZM cycle (Hale *et al.*, 1998: 10) which are: issue identification and assessment for the stretch of coast in question, setting objectives and preparation of policies and action plans, formalization through a law (or interagency agreement) and the securing of funds for implementation of some selected set of actions, policy implementation (where procedures and actions planned in the policy formulation stage are made operational) and evaluation. Hale *et al.* (1998: 10) argue that this last step in the process, the evaluation phase, is too often ignored or poorly executed, and could thus compromise the integrity of the entire process.

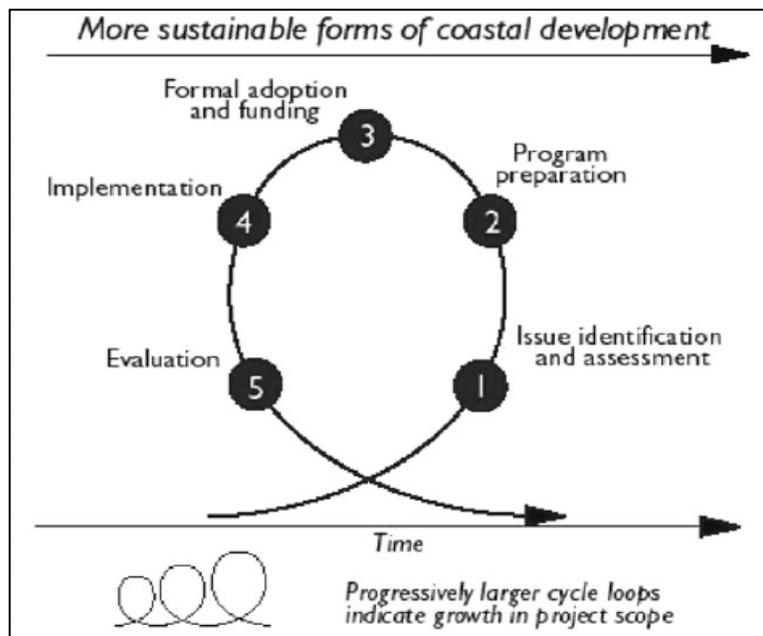


Figure 3.6 The ICZM policy cycle (Olsen, 2003: 357 adapted from GESAMP, 1996)

According to Olsen (2003: 348), ICZM initiatives designed to advance specific coastal contexts towards the dual goals of coastal management must be designed to be sustainable over long periods of time (often several decades), be adaptable to often rapidly changing conditions and lastly, to provide the mechanisms to encourage or require particular forms of resource use and collaborative behavior among institutions and user groups. Community participation (including the different knowledges of the coast) is essential for any ICZM program to be effective. On the one hand effective coastal zone management is important to improve the well-being of communities who depend on coastal resources now and in the future while on the other hand, ICZM needs to coordinate and mediate conflicts emanating from the different users and functions of the coastal zone (Hale *et al.*, 1998: 6).

The Food and Agricultural Organization (FAO, 1998 cited in Xue *et al.*, 2004: 271) asserts that the high degree of complexity in the coastal zone has led to an emphasis on integrated coastal management (ICM) as a governance mechanism for taking into account the various aspects of human activities and their management. Xue *et al.* (2004) argue that since EIAs tend to be project or activity specific, ICZM needs to incorporate a process to monitor and assess cumulative impacts.

Sardá *et al.* (2005: 427) underscore the importance of environmental information systems in ICZM processes. They specifically developed decision support tools as a methodological approach for coastal management which includes:

- The development of an environmental indicator-based report;
- The use of GIS; and
- The incorporation of different types of graphical packages.

They stress the importance of spatial tools and information for decision-making and management.

By reviewing secondary literature and providing synthesis of the ideas in existing studies of coastal management, Stojanovic *et al.* (2004: 283) identify important factors for successful ICM which include:

- **Comprehensiveness:** taking a sufficiently wide scope and full view of issues, including cumulative impacts, given that ICZM seeks to consider the coastal zone as a system of interconnectedness. The authors cite Cicin-Sain and Knecht (1998) who outline various dimensions to comprehensiveness which include setting geographical boundaries for initiatives and the level of decision-making at different geographical scales, specifically in terms of identifying actors/stakeholders and political responsibility for decision-making (Stojanovic *et al.*, 2004: 283);
- **Participation:** process by which there are opportunities for common contribution and balanced sharing of activities by interested parties. Participation is important since there is general consensus that if people participate in the process of taking a decision or developing a plan, they are more likely to support it. Participation also provides avenues for sharing of information and learning;
- **Cooperation:** process by which agencies operate together and are coordinated to one end. The basic premise is that more can be achieved when individuals or groups work together towards a common goal;
- **Contingency:** is an approach that seeks to account for local variations in strategy, environment or task. Contexts differ and it is possible that variations may account for or be related to certain causes;
- **Precautionary:** denotes an approach or activities undertaken in advance to protect against possible danger or failure. Specifically, anticipating and predicting the likely causes of environmental degradation, rather than reacting to their outcome, should mean that environmental management prevents the costs that originate in rectifying damages;
- **Long termism:** an approach that recognizes that environmental management needs more than brief views of environmental circumstances to understand and manage the links between the human and natural environment which include understanding how environmental changes are buffered by externalities, whether

reactions are incremental or related to thresholds, and how antecedent conditions affect coastal change;

- Focusing: is a “structured consideration of a problem in which an individual attends to the present experience” (Kantor and Zimring, 1976: 74 cited in Stajanovic *et al.*, 2004: 287). In this regard, stakeholder decision analysis and focus groups (workshops in particular) are identified as key tools for focusing which aid groups of decision-makers (and other stakeholders) to identify and prioritize important environmental issues at the coast. In part, this research adopted this methodological approach together with other data collection techniques;
- Incrementalism, which recognizes that management, is an iterative process that proceeds in a step-by-step manner. This approach seeks to be realistic and pragmatic in that environmental management that takes a stepwise development will have greater opportunity to incorporate disseminated experience and make detailed assessments on important issues, whilst returning to neglected implications later; and
- Adaptability, which calls for a more flexible and experimental approach that encourages greater social responsibility from those involved in management. It can increase capacity since it has a high learning element. Additionally, information is viewed as both a basis and a product for action.

### ***3.11.2 Strategies in the coastal zone***

Strategy formulation deals with the specification of policies and measures through the elaboration of an action plan, which is designed to guide strategy implementation in the short-to-medium term (UNEP, 2001a:16). The plan in turn links the goals and objectives with required policy, regulatory, economic and other measures (UNEP, 2001a: 16). No single program (even an integrated one), nor prescribed notion of sustainable development exists which can solve all the problems of the coastal region, hence prioritizing the issues and their spatial context is among the most crucial decisions that a program undertakes (Olsen and Christie, 2000: 12). Hale *et al.* (1998: 17) concurs by

asserting that programs fail when they try to do too much at once, are spread too thin, and then are seen as either irrelevant or a barrier to solving the problems they were created to address, hence considerable time and stakeholder input is needed to define and redefine issues, alternatives and opportunities upon which a program should focus its efforts. Furthermore, implementation of strategies depends on existing administrative and regulatory frameworks, although in certain cases suggestions for new institutional settings may be considered (UNEP, 2001a: 16). According to Hale *et al.* (1998: 17), it is of crucial importance to maintain a strategic focus throughout a coastal management program's development and implementation.

Since the 1970s ICZM proliferated through a multitude of efforts globally, resulting in approximately 700 ICZM strategies in 2002, which have been developed and reviewed further by ICZM practitioners and international assistance agencies owing to the different coastal contexts (social, ecological and political and levels of government) (Hildebrand, 2002 cited in Banica *et al.*, 2003: 39). ICZM employs a range of varied strategies including marine protected areas (MPAs), land use control, marine zoning and permit systems, conflict resolution, planning and fisheries management while external donor funded projects have been the main means of implementation of ICZM within developing countries (Christie, 2005: 209).

Within the Indian Ocean countries, for example, some countries such as South Africa, Tanzania, Mozambique and Kenya, have programs to address coastal issues at the national level, with South Africa being the first country to adopt a national ICZM policy in 1999 (Francis and Torell, 2004: 303). National level ICZM programs and strategies are necessary, as they facilitate broadening the scope of pilot projects, as well as the exchange of information between the different levels and scales of strategies (Francis and Torell, 2004: 303).

Implementation of ICZM strategies in the European Union indicate that a range of national level strategies exist, such as the development of standard European indicators for ICZM along the Spanish and Greek coasts (Shipman and Stojanovic, 2007: 387). The

Spanish strategies have focused on environmental and socio-economic issues (particularly issues raised from the intense level of coastal development, which is considered an important driver for implementing a national coastal strategy) (Shipman and Stojanovic, 2007: 387). Some nations are seeking to establish a national strategy for the coast, whereas others have not yet decided their approach or are seeking to include ICZM within other, broader instruments (Shipman and Stojanovic, 2007: 387).

### ***3.11.3 Critical Overview of Capacities for ICZM***

In recent years many ICZM initiatives have been undertaken. In most coastal zones, the delay in executing appropriate, adequate and efficiently enforced legislation over the years has resulted in failure with regard to the implementation of rational and sustainable decisions concerning coastal zone management (Burak *et al.*, 2004: 516). PROCOAST (2000 cited in Banica *et al.*, 2003: 38) has outlined the following areas as a constraint to ICZM initiatives: the separation of the terrestrial and marine components of the coastal zone from the legal and institutional point of view; sectoral approaches of the economic development planning and management of coastal areas and natural resources; lack of cohesion and consistency in policies, planning, investment and management strategies at different administrative levels; and lack of political awareness of the strategic importance of coastal areas and resources.

While the argument for integration is theoretically compelling, in practice, these principles are seldom realized, largely due to political and institutional weaknesses (Burak *et al.*, 2004: 516). Francis and Torell (2004: 300) concur and have attributed the proliferation of a wide range of anthropogenic disturbances in the Indian Ocean Region to poorly planned economic development; under-resourced government institutions; and weak implementation of existing policies and laws. This suggests that in order for ICZM to work efficiently, it requires political buy-in. Furthermore, Noronah (2004: 64) in observations from the coastal management policy in Goa, has identified two factors that give rise to policy problems, namely, the conditions of uncertainty, complexity and scale of ecosystems on the one hand, and the social aspirations of the local population on the

other (most significantly tourism). Governments strongly favor the foreign exchange earning, employment generating and economic growth potential of the tourist industry (Noronah, 2004: 64).

Despite the fact that the necessity of integrated approaches is widely recognized, most of the initiatives and projects developed and carried out have a rather narrow scope, either focusing on nature conservation, promoting sustainable tourism or place more emphasis on the terrestrial part of the coastal zone (UNEP, 2001a: 14). This is also the case in the coastal areas of the Mediterranean regions where existing sectoral management structures tend to tie up government expenditure on coastal management (in the widest sense) (McKenna and Cooper, 2006: 243). Most European countries have a well developed planning system on the terrestrial side that functions in an integrated way, however, the jurisdiction of regional planning authorities does not usually extend to the wet side, where responsibility is shared by various sector authorities hence this division of responsibilities is a major obstacle to spatial integration across the coastline (Bennett, 2001: 7). Furthermore, unclear sector responsibilities lead to conflicts of competence and sector agencies struggle not only over who has the right to manage certain resources, but also whose knowledge is correct and legitimate (Bennett, 2001: 7).

In addition, ICZM initiatives are seen as 'experimental' and lack the examination of long-term implications of the proposed procedures prior to extensive application, and consequently they are forced onto the funding fringes where they must rely on, and frequently compete for, external financial support (such support is usually short-term, rarely more than three years) (Haag, 2002: 11). A significant constraint to ICZM is insufficient or ineffective coordination between different government and local authority representatives (UNEP, 2001b: 24). Insufficient participation and consultation of coastal stakeholders is often cited as another reason for inadequate coastal management as well as for the degradation of the coastal environment (UNEP, 2001b: 22). Another important aspect to consider is evaluating ICZM. Billé (2007: 796) states that despite many efforts in the last decade, evaluating ICZM remains a challenge. Furthermore, McGlashan (2003: 395), states that since ICZM is about long-term sustainability, initiatives cannot be

sustaining without sufficient funding and staffing. This implies that resource aspects need to be carefully considered.

### **3.12 Strategic Environmental Assessment (SEA)**

The principal institutional challenge of the 1990s, according to the World Commission on Environment and Development in 1987, required consideration of “the ecological dimensions of policy at the same time as economic and other dimensions” (Dusik *et al.*, 2001: 11). Environmental Impact Assessment (EIA) was first legislated in the United States to assess the environmental impacts of proposed projects, under the National Environmental Policy Act (NEPA) of 1969. The effectiveness of EIA was to be measured in terms of its contribution to changing political institutions, and the worldviews and behavior associated with them: “[t]he logic of NEPA is clearly aimed at restructuring rules and values... through the forced institutionalization of ecological rationality” (Bartlett, 1997: 57). Since then, EIA has spread rapidly to all parts of the world.

Despite the existence of good EIA guidelines (which have been endorsed by institutions such as the World Bank and the UNEP) and legislation, environmental degradation continues to be a major concern in developing countries (Alshuwaikhat, 2005: 308). According to Dalal-Clayton and Sadler (2005 cited in Morrison-Saunders and Fischer), 2006: 23), strategic environmental assessment (SEA) is becoming a global trend, as a promising approach to integrate environmental, social and economic factors in environmental assessment.

The limitations of EIA are well documented (Alshuwaikhat, 2005: 308; Gontier, 2005: 5; Morrison-Saunders and Fischer, 2006: 20; Stinchcombe and Gibson, 2001: 364; Xiuzhen *et al.*, 2002: 101). In the first half of the 1990s, researchers emphasized the limitations of project-level EIA. The limitations stated by Alshuwaikhat (2005: 309) and Stinchcombe and Gibson (2001: 364) can be summarized as follows:

- Project EIAs react to development proposals rather than anticipate them, so they cannot steer development towards environmentally robust areas or away from environmentally sensitive sites;
- Project EIAs do not adequately consider the cumulative impacts caused by several projects or even by one project's subcomponents or ancillary developments, which can be significant. This is particularly significant while making distinctions between different approaches to considering biodiversity in environmental assessment. EIA favors the local scale, while assessments at larger physical scales or ecological levels are the exception (Joao, 2002 cited in Gontier, 2005: 12). Gontier (2005: 12) points out the need to rethink the scales used in the assessment and the consequences it could have on determining impact significance (Figure 3.6), for example, biodiversity impacts occur on large scales and the site specific nature of EIA is largely inadequate to address these issues. Furthermore, many international agreements, such as the International Association for Impact Assessment (IAIA) and the Convention on Biological Diversity, advocate adopting the ecosystem approach to biodiversity in environmental assessments (Gontier *et al.*, 2006: 268);
- Before preparation of the EIA, a project can be planned quite specifically, with irreversible decisions taken;
- Project EIAs cannot address the impacts of potentially damaging actions that are not regulated through the approval of specific projects;
- Project EIAs often have to be carried out in a very short period of time because of financial constraints and the timing of planning applications; and
- Foreclosure of alternatives, typically, by the project assessment stage, a number of options, which have potentially different environmental consequences from the chosen one, have been eliminated by decisions taken at earlier stages in the planning process, at which no satisfactory environmental assessment may have taken place.

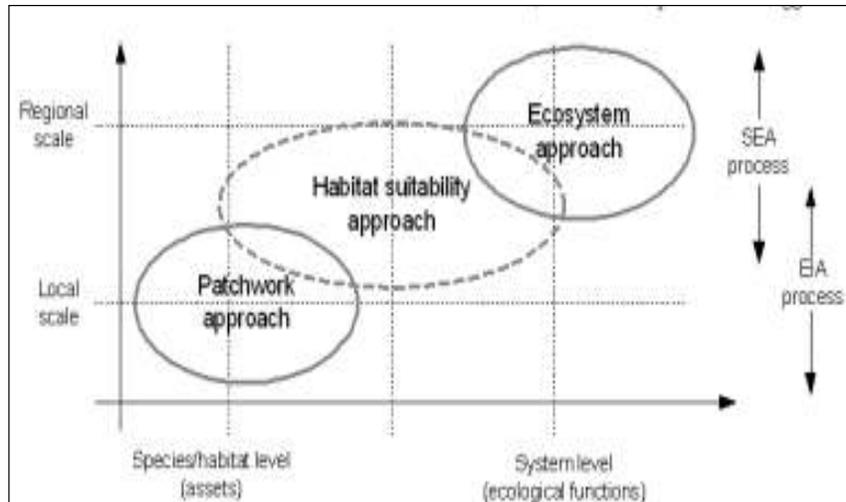


Figure 3.7 Different approaches to biodiversity assessment and their relationship to assorted physical scales and ecological levels (Gontier, 2005: 12)

These limitations imply that EIA has been narrow in its focus and applied at a project or local area level where critical attention to cumulative effects and broad alternatives is at best difficult and what is needed, clearly, is consistent integration of sustainability as a decision criterion in public policy-making. Furthermore, the link between SEA and sustainability is not just coincidental, as SEA emerged as a subject of deliberation and experimentation in part out of, and in response to the limitations of project EIA (Stinchcombe and Gibson, 2001: 346). Brown and Therivel (2000: 184) define SEA as:

*... a process directed at providing the proponent (during policy formulation) and the decision-maker (at the point of policy approval) with a holistic understanding of the environmental and social implications of the policy proposal, expanding the focus well beyond the issues that were the original driving force for the new policy... The intention of SEA is moving (policies, plans and program) towards sustainable outcomes.*

To this end, SEA has been promoted by landmark events such as the European Union (EU) SEA Directive in 2001 and the WSSD in 2002 (Retief *et al.*, 2007: 44). The WSSD resulted in a Plan of Implementation, which recommended an integrated approach to environment and development decision-making and while SEA is not explicitly

mentioned, it is clearly understood to be one of the frontline tools for giving effect for an inter-sectoral approach (Ministry of the Environment Government of Japan, 2003: 13). SEA can be conceived as continual process to ensure environmental issues are taken into account in all policy-making, generally demanding changes in political, organizational and procedural activities, so that environmental issues are taken on board as early as possible (Dalal-Clayton and Sadler, 1999: 1).

The ‘strategic’ in SEA lends itself to the fact that it can recognize options at higher levels, and early enough to integrate environmental considerations (such as ecological integrity and socio-economic inequalities) into development goals and objectives, as opposed to projects (Fischer *et al.*, 2002: 160). In its physical scope, SEA can be applied to the following types of policies, plans and programs: sector-specific policies, plans and programs; spatial and land use plans; regional development programs; natural resource management strategies; legislative and regulatory bills; investment and lending activities; international aid and development assistance; structural adjustment funds and operations; macro-economic policy and budgets; and fiscal plans (UNEP, 2002 cited in Ministry of the Environment Government of Japan, 2003: 13).

### ***3.12.1 ‘Sustainability-led’ SEA***

SEA considers the environmental effects of strategic actions and the best alternative options upfront and provides early warnings of cumulative, and spatially related actions which may be large-scale and uncertain (Dusik *et al.*, 2001: 15). According to Stinchcombe and Gibson (2001: 349), SEA is proactive in that it influences decision-making by information gathering of a range of sustainability considerations based on sustainability criteria for the definition of purposes and the selection amongst options, which should encourage more comprehensive goal setting exercises. According to Dusik *et al.* (2001: 15), it integrates the environment into sector-specific decision-making by promoting environmentally sound and sustainable proposals and changing the way decisions are made (long-term). These derive from what the World Bank calls “mainstreaming” the environment (Abaza *et al.*, 2004: 88). Due to the site specific nature

of EIA, they are not able to handle cumulative impacts. Furthermore, the insidious nature of cumulative effects and large-scale environmental change is beyond the space and time scale of EIA (Alshuwaikhat, 2005: 314), however, it is within the ambit of SEA.

SEA strengthens and streamlines project EIA by early identification of potential impacts and information needs, it clears strategic issues related to justification of proposals, thereby reducing the time and effort necessary to conduct individual EIA reviews (Dusik *et al.*, 2001: 11). This is why SEA is often not used as a substitute for EIA but as a compliment, to encompass a long-term strategy to realize policy and institutional benefits to the environment, including intergenerational equity regarding natural resources and sustainability (Stinchcombe and Gibson, 2001: 349).

### ***3.12.2 SEA in ICZM***

There is clear evidence that natural systems, and in the context of coastal zones, support social and economic systems, all of which are influenced by the political systems and governance structures (Brownlie *et al.*, 2006: A-8). SEA has the potential to enhance ICZM by identifying environmental opportunities and constraints to development in the coastal zone and thereby providing a strategic framework within which sustainable coastal development can occur.

ICZM initiatives and strategies are directed at the assessment and integration of the effects of plans and programs on the environment (Mercadie, 1999: 2), hence, there are synergies between the ICZM and the SEA process. Irrespective of the policies and programs, both ICZM and SEA encompass a range of strategic decisions, many of which are likely to have environmental, social or economic consequences. SEA can thus be adapted to different decision-making contexts such as (Dalal-Clayton and Sadler, 1998: 5):

- The policy area or sector covered, noting that in general, all policy areas which concern or lead to changes in the use of land and natural resources, the production

of raw materials, chemicals and other hazardous products and/or the generation of pollutants, wastes and residuals, are potential candidates for SEA; and

- The type of environmental effects that can be anticipated when moving from the policy to the project stage of the decision cycle and where environmental considerations correspondingly shift from indirect to direct or cumulative effects.

ICZM is a process by which rational decisions are made concerning the conservation and sustainable use of coastal and ocean resources and space (Christie *et al.*, 2005: 469). To this end, SEA is often presented as an assessment tool contributing to the accountability of natural resource depletion (Goodland, 1997 cited in Partidario, 2000: 650). It does so by assisting to “focus on maintaining the ‘source and sink’ functions of natural systems” (Sadler and Verheem, 1996 cited in Partidario, 2000: 650) or assisting the decision-making process by influencing the design of more sustainable policies and strategies (Therivel and Partidario, 1996 cited in Partidario, 2000: 650). According to the Strategic Environmental Assessment and Biodiversity: Guidance for Practitioners (South West Ecological Surveys *et al.*, 2004: 19), areas of high biodiversity are triggers for SEA, and include (and many of these are directly applicable to coastal zone contexts):

- Those which act as a buffer or play an important part in maintaining environmental quality or critical ecosystem processes;
- Support habitats, species populations, ecosystems that are vulnerable, threatened throughout their range and slow to recover;
- Support particularly large or continuous areas of semi-natural habitat; and
- Support semi-natural habitats that take a long time to develop characteristic biodiversity.

SEA is intended to help achieve a high level of environmental protection and is identified in key international agreements such as the Convention on Biodiversity and the Ramsar Convention, as an important tool for promoting the conservation and sustainable use of biodiversity (South West Ecological Surveys *et al.*, 2004: 15), which are also applicable to ICZM. Furthermore, Mercadie, (1999: 11) maintains that implementing plans and programs under the SEA Directive is virtually identical in the environmental assessment

procedure and in the ICZM procedure. It is clear, therefore, that there are synergies between the two procedures relating to the decision-making process, the information available and the assessment tools employed (Mercadie, 1999: 11).

### ***3.12.2 Limitations of SEA***

Limitations surrounding SEA development and application typically revolve around three key problem areas, these being technical and methodological, procedural and public participation problems (Xiuzhen *et al.*, 2002: 106-107). SEA is essentially information driven as they can involve huge geographic areas and cover many different ecosystems and communities with diverse characteristics, and hence requires up-to-date and credible socio-economic and ecological information on which to inform decision-making, unfortunately, such information does not always readily exist (Stinchcombe and Gibson, 2001: 358). The data that are available may be inconsistent, disrupted, confidential or inappropriate to the boundaries relevant to the policy, program or plan under study (Thérivel and Partidário, 1996 cited in Stinchcombe and Gibson, 2001: 358), hence limiting the ability of SEA to anticipate and monitor the environmental impacts of a policy.

The wide geographical scale, extended time periods and broad range of alternatives inherent in assessing plans can complicate the SEA. Conversely, the scope needs to be comprehensive and wide ranging in all SEAs to make an impact as a tool of sustainability (Partidário, 1996 cited in Stinchcombe and Gibson, 2001: 358). If boundaries are too narrow, options and alternatives become limited and policy formulation runs the risk of continuing on the unsustainable path of current trajectories (Stinchcombe and Gibson, 2001: 358).

SEA faces the fate of severe institutional resistance, and broad inclusivity and hence has not, in many instances, delivered on truly sustainable products (Owens *et al.*, 2004: 1945). Political will and support is crucial for SEA to be effective, however institutional resistance and lack of inclusiveness may be constraining the development and effective

application of SEA (Stinchcombe and Gibson, 2001: 363). Xiuzhen *et al.* (2002: 101) in their assessment of SEA development in China also find that public participation is often extremely limited, because policies and strategies are kept secret from the public, as well as due to methodological and procedural limitations.

It is not uncommon worldwide that governments operate in a highly fragmented manner with defined sectoral competencies and compartmentalization manner with clearly defined system boundaries and a sectoral division of political powers (Stinchcombe and Gibson, 2001: 364). Separate departments and even units within departments tend to be poorly coordinated and the structures generally lack the flexibility necessary for redistributing power and opening new channels of communication (Stinchcombe and Gibson, 2001: 364). Sustainability issues, by nature, cross the policy agenda and as a result, effective SEA demands greater coordination and cooperation across and within institutions than is currently achieved (Partidário, 1996 cited in Stinchcombe and Gibson, 2001: 364). Furthermore, Gandy (1999 cited in Owens *et al.*, 2004: 1945), argues that the ‘messy ambiguities of political debate’ are seen as ‘an intrusion capable of undermining regulatory efficiency’. A comprehensive SEA will therefore require new frameworks that can facilitate the information flows and decision coordination needed for a more consistent pursuit of common sustainability objectives. This poses significant challenges for SEA.

SEA speaks to a different level of public, that is, at the strategic level. However, seeking public openness at this strategic level poses many challenges and difficulties relating to transparency, disclosure of information and the usefulness of the information released. Furthermore, some policy decisions are required quickly or must be made confidentially because they are determined to be too sensitive for release to the public prior to approval (Lee and Walsh, 1992 cited in Stinchcombe and Gibson, 2001: 358).

Furthermore, according to Brownlie *et al.* (2006: ii), in their situation assessment for biodiversity inclusive environmental assessment in the Southern African Development Community (SADC), the development imperative in most countries requires short-term

socio-economic benefits to be realized. Furthermore, their findings are consistent with the general findings regarding inadequate consultation between government departments (Brownlie *et al.*, 2006: ii). They add that the findings indicate a general lack in competencies with regard to lack of appropriate experience in government departments to properly review environmental reports and there is a general lack of clear guidance or criteria on which to base decisions which result in inconsistencies in decision-making, for example, the lack of clarity about sustainability principles and how to apply them, such as the Precautionary Principle (Brownlie *et al.*, 2006: ii).

The sustainability approach to SEA is becoming more widespread, not least because it ties in well with the wider integration agenda of sustainable development (Sheate *et al.*, 2001: 52). However, translating it into effective implementation on the ground is fraught with problems, which can undermine a highly effective tool for aiding ICZM efforts.

### **3.13 Spatial analysis in SEA within the context of coastal zones**

Coastal areas are clearly the ‘hotspots’ of global environments, experiencing the most profound socio-economic and cumulative environmental changes at the local level. The vulnerability of coastal zones requires utilizing a more holistic perspective. A broader geographic perspective of the coastal environment is therefore needed to clearly reveal status and connections among various interacting factors (Shi and Singh, 2003: 145), perhaps by means of an SEA for coastal zones.

Hence developing suitable and reliable information which is easily accessible and consultable according to management objectives and capable of lending support to strategic decision-making regarding likely environmental change that takes place in coastal zones is necessary (Trujillo *et al.*, 2003: 1). However, decision-making on evaluating sustainability in the coastal zone cannot be performed ‘a-spatially’ by relying on statistical reports, but needs to integrate various types of information (measurements, sample data, aerial data) (Blaschke, 2006: 202). Taussik (2007: 611) underscores the importance of spatial planning for ICZM. Spatial planning, simplistically put, is “what

goes where” and it can be applied “to any activity with a spatial, or geographical, dimension, be it on land or in the marine environment, and concerns where a particular activity or development can be undertaken” (Taussik, 2007: 612). The main tool is zoning and in the coastal zone it is important for coastal risk management, nature conservation and recreation management. Geographic Information Systems (GIS) and remote sensing techniques offer integrated environmental modeling and assessment opportunities in ICZM and SEA.

Rodriguez *et al* (2009: 100) assert that GIS besides being a useful tool for drawing maps on different scales and projections, constitutes an excellent instrument for data analysis and integration due to its ability to identify spatial connections between different information layers. Specifically, their study shows that GIS is useful to build models for geomorphological evolution and predict changes in the coastal areas. They illustrate three GIS applications that demonstrate the usefulness of the tool in coastal management:

- In coastal hazards management GIS helps with statistics analysis, needed to carry out a multivariate spatial-temporal model that estimates the probability of hazard occurrence;
- Dealing with shorelines corresponding to different years, GIS allows the analysis of the evolutionary trends to define the behaviour of the system; and
- GIS used in studies of the evolution of dune fields is essential in order to estimate dune migration rates and analyze all the variables involved in this process.

Remote sensing applications in coastal zones have many advantages, including the capability to collect data over large tracts of land at any one time, providing monitoring or frequently repeated measurements and at a range of scales, from low resolution data covering large areas, to high resolution data covering smaller areas thereby offering a hierarchical data source that can frequently be matched to process hierarchies found within the human and natural environment (Fassnacht *et al.*, 2005: 2; King and Green, 2001: 1). Phinn *et al.* (2000: 119) have identified four types of information which can be derived from remote sensing data, these being, landscape composition, landscape pattern, biophysical parameters and changes in time of these three elements. Furthermore, Shi and

Singh (2003: 145) have elaborated on the usefulness of employing night-time satellite images, “bright spots” displaying concentrations of light emitted into space from cities and towns to assess population concentration and distributions. GIS provides a suite of geospatial data handling tools allowing for the integration and analysis of multiple datasets from many different sources, thereby providing the user with the necessary spatial data handling functionality to undertake tasks, such as merging, overlay, and recodes (King and Green, 2001: 2).

According to Dalkmann *et al.* (2004: 127), the use of spatial techniques in environmental studies offers other important advantages to conventional procedures such as the identification of spatial and temporal variability of impacts, while conventional methods are static in space and time. To this end, remote sensing and geographic information systems (GIS) based change detection studies have predominantly focused on providing the knowledge of how much, where, what type of land use and land cover change has occurred (but very little on why these changes have occurred) (Weng, 2002: 274). Apart from change, which is a necessity for development but often leads to conflict, decision-makers also have to make informed decisions regarding land suitability for various proposed land uses thereby minimizing conflict (Bojorquez-Tapia *et al.*, 2001: 130).

A distinct characteristic of SEA is that it deals with a wider, less detailed spatial scale (for example, landscapes) and is therefore more capable of handling large-scale environmental impacts, in addition to contributing to up front decision-making (Dalkmann *et al.*, 2004: 126). This sequence is important, suggesting strongly that spatial information can contribute to informed environmental decision-making. According to Vanderhaegen and Muro (2005: 126), GIS are used in all stages in the preparation of environmental assessments due to its capacities for spatial data integration. They cite the cases where the most frequently used spatial data in the European Union relate to area regulation (protected sites and land use) and biodiversity (vegetation and habitat data), while the least frequently used data relate to oceans and health (Vanderhaegen and Muro, 2005: 131).

Dalkmann *et al.* (2004: 388) caution that SEA has to go beyond just the analysis of environmental impacts (providing rational information) of decisions and influence the content and values that govern decision-making, such as the economy, changing lifestyles and different priorities in land consumption (Blaschke, 2006: 201). Since values and attitudes over natural resources vary between social organizations, the goal is to provide the constituencies with an opportunity to collaborate and to attain consensual decision-making (Bojorquez-Tapia *et al.*, 2001: 129). This, in principle, allows interdisciplinary collaboration and non-expert participation is often realized in the generation of alternative planning scenarios (Botequilha Leitao and Ahern, 2002; Tress and Tress, 2003 cited in Blaschke, 2006: 201).

### **3.14 Conclusion**

Successful ICZM relies on three key foundations: that there is integration between all the various stakeholder groups that are involved in coastal zone management, that the coastal zone is defined with at least three components, the marine, intertidal and terrestrial; and that data is provided to coastal managers about the whole coastal zone, and is accessible to all those people who need it for decision-making (King and Green, 2001: 13). These characteristics of ICZM highlight the adoption of holistic notions of coastal areas as interdependent systems in landscapes. The vulnerability of coastal societies and ecosystems to conditions of uncertainty also requires that strategic management is a necessity. ICZM recognizes that sustainability is a multi-faceted issue and that there are no simple solutions to address non-sustainability, hence it requires that management adopt an iterative approach grounded in comparative research in a variety of sites, and the contextualization of these findings to make them relevant to local conditions. While the theory has recognized these fundamentals, translating them into practice proposes particular challenges. Traditional management tools, such as EIA are limited in their capabilities of handling the complexity that coastal zones present. SEA appears to present more promising prospects to this end. It is envisaged that spatial analysis can be a powerful addition that could both strengthen SEA and provide invaluable information for strategic management and decision-making in coastal zones.

## CHAPTER 4

### Coastal Zone Management in South Africa

#### 4.1 Introduction

Coastal resources of South Africa are a rich and diverse national asset, demonstrated through the reciprocal relationships between ecosystems providing direct and indirect benefits to society and in turn, society's reliance on these ecosystems to provide socio-economic development. The relationships between the socio-economic and ecological systems of the coast reflect the value of direct benefits derived from coastal ecosystems which annually contributes to approximately 35% of the Gross Domestic Product (GDP) (R168 billion) to the South African economy (DEAT, 2000a: 120). However, increasing anthropocentric pressures on the country's coastal ecosystems have changed the functioning and structure of many of their components, cumulatively resulting in degradation and resource loss. Coastal issues in South Africa are not devoid of the overall context of the development arena taking place at the national level. According to Glavovic and Boonzaier (2007: 1), confronting poverty and social equity are arguably the most challenging issues facing the government. Additionally, South Africa's coast has a significant role in meeting basic needs and improving the well-being of coastal communities, where 40% of the country's population is located (DEAT, 2006a: 173).

After almost a decade of deliberation with regard to policy formulation in ICZM, efforts have legislatively translated into the National Environmental Management: Integrated Coastal Management Act of 2008. The Act has come into effect to "establish a system of integrated coastal and estuarine management, including setting policies and clarifying government roles to ensure that development and use of coastal resources is socially and economically justifiable and ecologically sustainable" (DEAT, 2008: 2). Furthermore, the Act legally effects South Africa's international obligations and commitments in relation to coastal issues (DEAT, 2008: 2).

Several authors (Cicin-Sain and Knecht, 1998; Cicin-Sain, 2000 cited in Shipman and Stojanovic, 2007: 376) have demonstrated that the ‘maturity’ of ICZM is reflected in the strength of its institutional arrangements and policy-making approach and the emphasis is on integration within them which provides a means of achieving sustainable development. This chapter assesses the context and process of coastal policy formulation and institutional development in South Africa, building on international best practices of ICZM, which provide useful indicators. This chapter also reflects on the successes, failures and future directions in relation to home grown initiatives.

#### **4.2 The South African coast: A national asset**

South Africa’s coastline extends approximately 3 650 km in length, stretching from the border of Namibia on the west coast to the border with Mozambique on the east coast (Glavovic, 2000: 5; Lombard *et al.*, 2004: 6). South Africa’s coastal characteristics are shaped by its location at the tip of Africa where it is influenced by two distinct and uniquely contrasting ocean systems, which are the Atlantic (on its west coast) and Indian (on its east coast) (Glavovic, 2000: 33; Brownlie and Wynberg, 2001: 3). Figure 4.1 illustrates the oceans impacting on South Africa, and it also places the province of KwaZulu-Natal within the context of this study.

The particular characteristics of the currents within these oceanic systems determine the productivity of the coastal waters as well as influence local climatic conditions at the different locations along the South African coast. The differences in terrestrial landforms, rivers, weather patterns and ocean character are also reflected in the distribution of plants and animals, particularly in the marine environment, but also in the terrestrial landscape (Glavovic, 2000: 33). Other factors influencing coastal ecology are tides, salt spray and the formulation and re-formulation of coastal sediments such as beaches and dunes (Mucina *et al.* 2006 cited in Mucina and Rutherford, 2006: 661).



and Rutherford, 2006: 32). The region's low rainfall means that there are very few perennial rivers in this region and the arid climate has discouraged human settlement and large parts of this region are uninhabited (Freedman, 2006: 3). In addition, public access to the coast is frequently limited by poor road infrastructure and security restrictions enforced by diamond mining operations which occur in this region (Freedman, 2006: 3).

On the east coast, the warm Agulhas current flows southward, bringing nutrient-poor tropical water from the equatorial region of the western Indian Ocean (Lombard *et al.*, 2004: 6). Although these waters are low in bio-productivity, they have high species diversity, giving rise to coral reefs and mangroves (Lombard *et al.*, 2004: 6). Furthermore, two-thirds of South Africa's rivers are located on the east coast (Freedman, 2006: 2) and therefore the marine environment receives high river inputs (sediments and nutrients) from numerous sources along the coast thus contributing to marine ecosystem productivity (Turpie, 2004: 12). According to Rutherford *et al.* (2006 cited in Mucina and Rutherford, 2006: 32), the Indian Ocean coastal belt of South Africa, with its recurrent pockets of forest vegetation, represents the southernmost extent of coastal (sub) tropical forests of the wet, tropical and subtropical seaboard of east Africa.

The coastline is characterized by long sandy beaches interspersed with rocky outcrops and backed by well-vegetated dunes (Freedman, 2006: 2). These bio-physical factors have contributed to dense human settlements whose economy is dominated by port activities, light and heavy industry, commercial and subsistence agriculture, dune-mining and tourism (Freedman, 2006: 2). Thus, the South African coast is extremely diverse, in terms of both terrestrial and marine climatic patterns, geological, hydrological and biological characteristics (Glavovic, 2000: 33).

#### **4.3 Socio-economic trends in South Africa's coastal cities**

According to Brownlie and Wynberg (2001: 3), "South Africa's cities are illustrated by a dichotomy of both developing and industrialized economies and as a result the country's environmental problems represent a microcosm of the world's environmental concerns". For example, it shares the characteristics of high population growth, natural resource

depletion, increasing urbanization, and high levels of poverty and unemployment which is reflective of most developing countries (Brownlie and Wynberg, 2001: 3). While in terms of industrialized countries, it typically exhibits symptoms of severe air and water pollution, over-consumption by the affluent and problems associated with waste disposal (Brownlie and Wynberg, 2001: 3), which have serious implications for biodiversity. Furthermore, according to Celliers and McKay (2005: 1), unlike other countries who rely on economic transactions (GDP) built on historical and cultural heritage, Africa, and South Africa in particular is also promoting its natural heritage. For example, nature-based tourism or ecotourism, is one of the fastest growing sectors, comprising a major part of the economy in many countries such as Botswana, Namibia, Seychelles, Mauritius, Mozambique, South Africa, Tanzania and Zambia (Brownlie *et al.*, 2006: A-7).

In South Africa, the key pressure points impacting on coastal environments are the large and growing coastal populations (not exclusive from the implications of apartheid) as well as the increase in international tourism (Haag, 2002: 11; Freedman, 2006: 4). The tourism sector is the third largest generator of foreign exchange in South Africa, after manufacturing (24.4%) and mining and quarrying (8.6%), in its contribution to the economy at 8.2% (Spenceley, 2003: 3). Furthermore, in recent years coastal development is being driven by the appeal of living at the coast coupled with personal wealth, people retiring to the coast, an increase in coastal holiday homes and resorts, and demand for recreation and tourism associated with the coast, as well as net in-migration of people seeking jobs (DEAT, 2006a: 173). This escalation in residential development is further compounded by simultaneous advances in other sectors which are seen to boost the country's economy on a national scale, such as the heavy mineral mining sector which has focused solely on the coastal environment (Celliers and McKay, 2005: 1).

Statistics indicate that the greatest land use in coastal locations takes place within its largest metropolises such as Cape Town (25%), eThekweni (27%), and Nelson Mandela (12%), with Cape Town, eThekweni, and iLembe municipal areas having been the most transformed (degraded, converted to urban land use and agriculture) from their natural

state (DEAT, 2006a: 173). The growth potential in these urban areas is phenomenal, for example, Cape Town, Durban, Nelson Mandela Metropole and East London contributed 82% of the growth in coastal Gross Geographic Product (GGP) in 1993–1994 (Glavovic and Boonzaier, 2007: 6). Furthermore, geographically, these cities and other medium-sized towns comprise approximately 10% of the coast, yet they generate more than 90% of wealth along the coast (Glavovic and Boonzaier, 2007: 6).

International theory indicates that spatial inequality is a product of both growth and the dynamic qualities of areas which are developed historically and culturally over a long period of time, for example, 50% of the GDP in the United States is produced in 2% of its space and 82% of the European Union's GDP is produced in 36% of its area (Policy Coordination and Advisory Services, 2004: 6). Furthermore, convergence between developed and undeveloped regions takes time, and is more successful where poor regions are functionally linked and connected to centers of economic activity (Policy Coordination and Advisory Services, 2004: 6). Hence, South Africa is not unique in spatial inequality however, this inequality is not only the product of growth but also apartheid spatial planning, where an inherent disjuncture exists between where people live and where economic opportunities exist (Policy Coordination and Advisory Services, 2004: 7). This stems from its history of inequitable policy such as The Natives Land Act 27 of 1913 which confined the majority of the population to 13% of the land were neither developed nor had development potential (Vrancken, 2009: 202). This was followed by an attempt to stop the process of black urbanization with tools such as the Natives (Urban areas) Consolidation Act 25 of 1945, the Group Areas Act 41 of 1950 which constrained non-white South Africans to reside away from the shore and the Reservation of Separate Amenities Act 49 of 1953, which allowed local authorities to segregate public amenities such as beaches (Vrancken, 2009: 202). Hence, coastal poverty is strongly correlated with rural coastal areas, particularly in the former homelands, and in the informal settlements of towns and cities, mainly populated by black South Africans (Glavovic, 2000: 66-67).

This spatial marginalization from economic opportunities is still a significant feature of the South African space economy that needs to be addressed in order to reduce poverty and inequality, and ensure shared growth (Policy Coordination and Advisory Services, 2004: 7). As indicated in Chapter one of this study, a situational analysis of South Africa, conducted by the United Nations Development Program (UNDP, 2006: 2), reveals persistently high unemployment rate, widespread poverty, large wealth disparities, high HIV/AIDS infection rates, a dual formal/ informal economy, a low skills base and wide urban-rural disparities.

Given the value of the coast, these areas offer development opportunities (primarily port facilities, industries, roads and housing) which may promote local and regional economic development, thus increasing the pressure to develop (DEAT, 2006a: 170). While there appears to be an economic boom occurring within the coastal zones of South Africa, the structure and functioning of key ecosystems (estuaries, dunes, grassland) are under threat of being severely damaged, polluted or totally wiped out as a result of increasing pressures from the demands of development (Celliers and McKay, 2005: 1; TKZN, 2005a: 3). Freedman (2006: 4) targets four specific threats to South Africa's coastal and marine environment, namely, the expansion of coastal cities and towns, exploitative recreational fishing, mining activities (which have seriously impacted dune systems, disrupted the sea-bed and altered sea-bed habitats) and the large-scale exploitation of the coast to the benefit of white South Africans (racial exclusion of black South Africans from most coastal areas denied them the opportunity to use and benefit from coastal resources). The development of coastal areas has been particularly profitable in terms of the residential sector, especially golf estates (DEAT, 2006a: 173). According to a report by the Amalgamated Bank of South Africa (ABSA) (2007: 5), "the demand for coastal property is expected to continue to outstrip supply, so property prices in these areas are forecast to rise further in future, causing coastal property to become even more exclusive and less affordable".

Given that this natural foundation is responsible for the healthy functioning of the coastal zone (in terms of protection, ecology and utilization), the ever-growing demands being

placed on increasingly degraded ecosystems seriously diminishes the prospects for sustainable development. Decision-making along the South African coastline thus reflects that activities which generate short-term financial gain far outweigh the need for an ecological approach that considers the long-term societal benefits of a shared society (Celliers and McKay, 2005: 1). Despite its unusual geographic position, its unique ecosystems, and its peculiar problems, the coastal zone in South Africa has only recently been identified by the government as a distinct system which requires its own dedicated management program (Freedman, 2006: 5).

#### **4.4 Integrated Environmental Management (IEM) in South Africa**

Since the latter part of the 1980s, integrated environmental management (IEM) has increasingly become internationally recognized as a principal paradigm for environmental management, research and evaluation (Bille and Mermet, 2002: 913). In South Africa, the dominant planning approach under apartheid was integrally linked to the concept of “blueprint” or “master” planning, which largely focused on physical planning or land use control to promote the spatial ordering of land, though the manipulation of the physical environment to implement the plan of orderly, racially separate and unequal development (Ministry of Agriculture and Land Affairs, 2001a cited in Rossouw and Retief, 2005: 188). Therefore, planning and environmental management operated as dualistic concepts in theory and in practice. Both processes largely excluded participation, which when included, was limited to objections after draft plans were developed (Rossouw and Retief, 2005: 188).

In South Africa, post 1994, the concept of ‘integration’ has become a central theme of contemporary planning to redress the integration of the segregation of its cities (Wilkinson, 2002: 1). IEM is broadly defined (DEAT, 2004: 8) as follows:

*IEM provides a holistic framework that can be embraced by all sectors of society for the assessment and management of environmental impacts and aspects associated with an activity for each stage of the activity life cycle, taking into consideration a broad definition of environment and the overall aim of promoting sustainable development.*

Central aspects of this definition are discussed below.

The concept is generally taken to refer to three possible forms or dimensions of integration: integration between different spheres or levels of government, integration between different sectors of service delivery or planning, and integration between the often organizationally separate functions of planning and budgeting (Wilkinson, 2002: 1). Clearly, most of South Africa's racial policies have had a spatial component. It is crucial then to view the economic programs and environmental assessment policy in South Africa as they have distinct implications for the new development planning system which aims to promote spatial integration and equitable distribution of natural resources (Rossouw and Retief, 2005: 188), in this case specifically in the context of the coastal zone.

There have been a number of significant changes in legislation and policy since 2000 which emphasize the link between environmental assessment, strategic planning and land use planning. The first was the Development Facilitation Act 67 of 1995 (DFA). Its purpose was to facilitate and speed up land delivery, as well as lay down general principles governing land development throughout South Africa (Nel, 2009: 2). A Land Use Management Bill drafted concurrently with the White Paper on Spatial Planning and Land Use Management of 2001 is expected to repeal the DFA, and provide for a single land use management system based on development facilitation within South Africa (Nel, 2009: 2).

The Municipal Systems Act 32 of 2000 (MSA) establishes community participation in planning and specifies that municipal services must be environmentally sustainable (Rossouw and Retief, 2005: 190). The MSA also requires local government to engage in

new forms of planning, termed Integrated Development Plans (IDP), the central aims of which are to provide a holistic, integrated and participatory strategic plan guiding the work of the municipality, known as Spatial Development Frameworks (SDFs) together with a Land Use Management System (LUMS) which can apply to the whole municipality (Rossouw and Retief, 2005: 190).

Government's socio-economic programs applicable to the whole country, in the form of coastally-orientated development policies and initiatives such as the Growth, Employment and Redistribution Strategy (GEAR), Accelerated and Shared Growth Initiative of South Africa (ASGISA) and Spatial Development Initiatives (SDIs) are promoting development in coastal areas (UNDP, 2006: 2). Some of these initiatives, particularly the SDIs, have concentrated on huge capital-intensive projects oriented towards exploitation of mineral resources. However, the schism between socio-economic and ecological aspects raises challenges of strategically linking economic growth and poverty eradication to rising levels of natural resource utilization, waste generation, and the wide- scale, cumulative negative impacts on the environment (DEAT, 2006b: 2).

Environmental assessments are tools used to manage the impacts of proposed activities on the environment and EIA is the key assessment technique which is legislated in South Africa. Although the Environmental Conservation Act (ECA) exists, many of its provisions, particularly in terms of EIA have been repealed by the National Environmental Management Act (107 of 1998) and are contained in Sections 23 and 24 of Chapter 5 of the National Environmental Management Act (NEMA). Among the shortcomings of the ECA were that it only made provision for EIA and not monitoring, auditing and environmental management planning (Tarr, 2003: 57) as well as the lack of strategic management tools (DEAT, 2006d).

The IEM philosophy (of integrating environmental issues into all stages of policy, planning and the project cycle) was therefore lost (Tarr, 2003: 57). However, the NEMA brought back the IEM philosophy and procedure through the new regulations. Under this Act, the general objectives are to “ensure the integrated environmental management of

activities” (DEAT, 1998: 34). ‘Activities’, as used in Chapter 5, are defined as policies, programs, plans and projects (DEAT, 1998: 8). In terms of the Act, the impacts of “activities” that require authorization by law, and which may “significantly affect” the environment, must be considered, investigated and assessed and reported to the authority responsible for authorizing or permitting the activity (DEAT, 1998: 34). Therefore, although not explicitly stated, environmental assessments (either SEA or EIA) can be required in terms of S24(1) of the Act (DEAT, 1998: 34).

The NEMA regulations do make some provision for forms of strategic assessments such as (DEAT, 2006d):

- Environmental Management Frameworks (EMFs) are strategic tools that assess the *status quo* of a geographical area in terms of its biophysical, built and “planned” environment. Furthermore, it defines a desired state of environment and determines the route to this desired state. The EMF is further consistent with “environmental control zones” and environmental management policy, where certain pre-determined activities when aligned with control zones and environmental management policy are then excluded from EIA requirements. EMFs are also useful as environmental inputs into Spatial Development Frameworks and precinct plans (discussed in the next section);
- Sector guidelines which can also be used for exclusions; and
- Class applications, where one application and process can take place for many different activities occurring in one geographical area or one application and process for the same activity type proposed to take place in different locations.

Whilst the definition of “activities” in this Act extends to policies, programs and plans, the focus of environmental assessment in South Africa remains on project level EIA. No regulations regarding strategic level assessments have been promulgated although a guideline document for undertaking SEA in South Africa but the Department of Environmental Affairs and Tourism highlight 10 principles for SEA as a theoretical base for the development of local SEA processes (DEAT, 2000b: 7):

- SEA is driven by the concept of sustainability;

- SEA identifies the opportunities and constraints which the environment places on the development of plans and programs;
- SEA sets the criteria of environmental quality or limits of acceptable change;
- SEA is a flexible tool which is adaptable to the planning and sectoral development cycle;
- SEA is a strategic process which begins with the conceptualization of the plan or program;
- SEA is part of a tiered approach to environmental assessment and management;
- The scope of an SEA is defined within the wider context of environmental processes;
- SEA is a participative process;
- SEA is set within the context of alternative scenarios; and
- SEA includes the concepts of precaution and continuous improvement.

ICZM presents an excellent example of the strengths and weaknesses of IEM for the following reasons: there is sufficient general guidance literature on ICZM as an international practice (Coastal Zone Canada Association, 2000 cited in Bille and Mermet, 2002: 916), considerable experience exists in coastal management covering land and near shore waters (UNESCO, 2006: 6) and a number of pilot studies, projects and experiences have received significant funding (Bille and Mermet, 2002: 914); however these ICZM efforts are falling short in terms of implementation (Bille and Mermet, 2002: 914; UNESCO, 2006: 6). According to Bille and Mermet (2002: 916), questions around ICZM now move away from asking how ICZM can be improved (the answer being, through integration), but as to how integration can be improved and evaluated?

#### **4.5 The South African coastal policy process**

Shipman and Stojanovic (2007: 376), in their analysis of ICZM in Europe assert that recent attempts to evaluate the maturity of ICZM have focused on examining whether it is reflected in institutional arrangements and constituencies (Cicin-Sain and Knecht, 2000 cited in Shipman and Stojanovic, 2007: 376) as well as the foundation of policy-making

(Bridge and Gilbert, 2001 cited in Shipman and Stojanovic, 2007: 376). This kind of approach emphasizes the key element of integration, as reflected within and between organizations, as a means of achieving sustainable development (Shipman and Stojanovic, 2007: 376). This situation draws parallels which are reflective of and can be applied to the South African policy formulation process.

Glavovic (2006a: 890) distinguishes four key spheres of coastal management over the last thirty years in South Africa, namely, *ad hoc* sector-based management (1970s); coastal regulations, ecology and experts (1980s); participatory policy formulation (1990s); and people-centered, pro-poor ICZM (2000). These efforts reflect “a sea-change from parliamentary sovereignty to constitutional supremacy, including the wide-ranging entrenchment of human rights” (Vrancken, 2009: 202).

South Africa has adopted a new legislation which promotes sustainable coastal development through integrated coastal management, the National Environmental Management: Integrated Coastal Management Act of 2008 (NEMICMA). Formulated through the Coastal Management Policy Program (CMPP) in the mid-1990s, it represents a change in mindset from earlier “biophysical and bureaucratic views to a participatory approach driven by human development imperatives and the need to promote sustainable livelihoods” (Glavovic, 2006a: 899).

The main objectives of the CMPP were to: promote meaningful public participation, advance scientific integrity to improve knowledge and understanding of the interdependencies between natural and anthropogenic systems, to promote integrated coastal management, and build a practical policy (Glavovic, 2006b: 920). The coastal policy formulation process (Figure 4.2) discusses the chronology of steps adopted by the CMPP from the mid-1990s to the adoption of the White paper in 2000. At the time, this process precluded the National Environmental Management: Integrated Coastal Management Bill, and in 2008, its translation into a legally binding Act (the NEMICMA), which was the next step of legislating South Africa’s national coastal legislation.

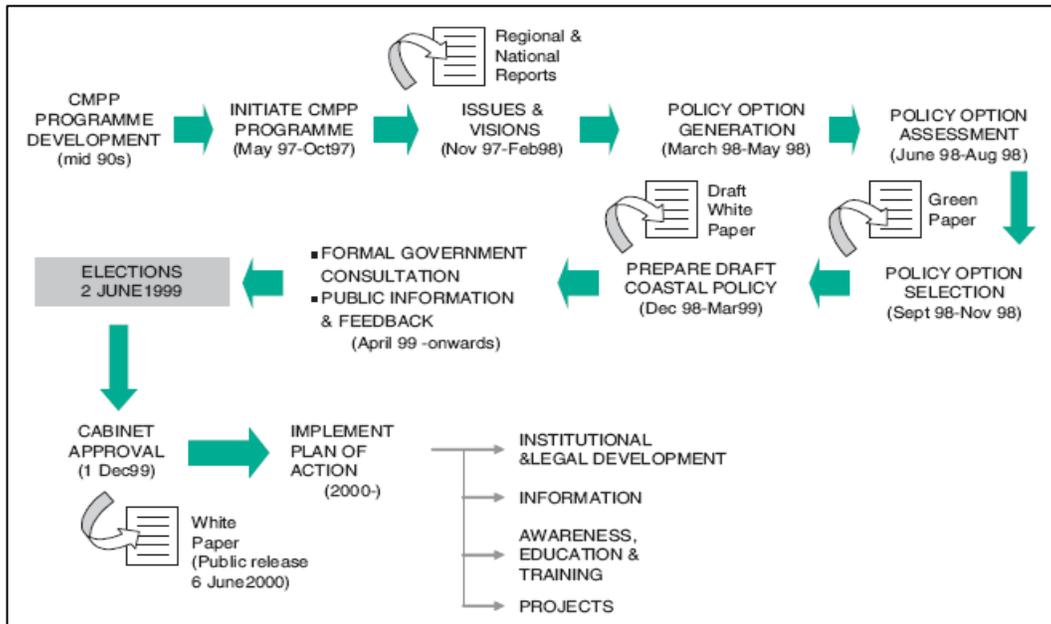


Figure 4.2 The South African coastal policy formulation process (Glavovic, 2006a: 892)

#### 4.5.1 Implementation of CZM 1970s-1980s

A brief prelude to CZM efforts in South Africa is needed to contextualize the necessity for the initiation of a CMPP. Coastal management in the 1970s was primarily conducted on a sector-by-sector basis by a wide range of agencies responsible for coastal and marine functions (Glavovic, 2006a: 890). In a sense, marine management was undertaken with a back to the land and coastal land management with a back to the sea, hence activities were uncoordinated and little attention was given to the interdependencies between activities and those in the land-marine connection (Freedman, 2006: 5). Although government departments have sectoral policies for the coast, the confusion over responsibilities is exacerbated by the fact that there is no framework to coordinate implementation (Shipman and Stojanovic, 2007: 381). By the end of the 1970s there was recognition that the sectoral approach was not working and the misuse and over-use of coastlines and estuaries required a fresh approach to planning and management (Haley *et al.*, 1998: 2).

In the early 1980s the then Department of Environmental Affairs (renamed DEAT after the 1994 elections) resorted to the use of development control to stem the tide of township and resort development which it perceived as the biggest threat to its coastlines (Glavovic, 2006a: 890). These operated on an *ad hoc* basis as there was no formal tool to regulate development impacts on the environment, such as EIA which was mandated in 1997 (Glavovic, 2006a: 890). Attention then turned to the use of the role of scientific advice and expert knowledge in ICZM.

Shipman and Stojanovic (2007: 390) maintain that while academics and scientists have been active in producing research to support coastal management through key marine science research institutions and programs (such as the Council for Scientific and Industrial research in South Africa which built up considerable research expertise in the 1980s) (Glavovic, 2006a: 891), debates tend to focus on scientific issues themselves rather than their application in ICZM (Shipman and Stojanovic, 2007: 390). Hence, although considerable knowledge was built regarding coastal setback lines, agricultural potential, inter-tidal productivity and the conservation importance of coastal vegetation; these efforts were occurring within a vacuum with little consideration of socio-economic issues and the politics of coastal management in South Africa (Glavovic, 2006a: 891). In the mid-1980s, the impetus to establish a coastal policy grew through the establishment of the Coastal Management Advisory Program to improve public and government awareness about the value of and ecological processes of the coastal zone and its sensitivity to anthropogenic influences (Glavovic, 2006a: 891). Although the role of science for management is still viewed as essential, it is now best viewed as informing the policy debate and clarifying options for and implications of different policies (Haley *et al.*, 1998: 2).

#### ***4.5.2 From bureaucratic control to democratic engagement with governance***

It was in the 1990s that awareness was heightened to the fact that the bureaucracy of powers on the coast was resulting in a “democratic deficit” as there was little engagement with governance by the general public (Shipman and Stojanovic, 2007: 382).

Furthermore, Shipman and Stojanovic (2007: 390) emphasize that bureaucracy obviates the consideration of strategic or integrated resource planning and use, reduces opportunities for local actors to reflect their concerns about activities below the mean low water mark, as they can on shore and reduced local ownership of global issues such as the impact of climate change or the management of natural resources.

The mid-1990s heralded a shift from a resource-centered approach to a people-centered approach in ICZM in South Africa (Glavovic, 2006a: 892). This shift has come with the realization that ICZM is a largely governance (rather than a technical) process and as such, should apply societal values to the definition, use and management of coastal resources (Haley *et al.*, 1998: 2). According to Sowman (1993: 167), up to this point, ICZM had not considered issues such as encouraging sustainable economic development, improved access to coastal resources, and public involvement in planning and decision-making, which were increasingly amalgamated into the socio-political changes occurring during the pre-and-post 1994 period in South Africa.

#### ***4.5.3 The CMPP: A process of 'policy dialogue'***

In order to develop opportunities for meaningful public participation, it was recommended that coastal stakeholders engage in a process of 'policy dialogue' (the CMPP) prior to formulating policy content (the White Paper) (Glavovic, 2006a: 893). Policy dialogue involves efforts that sketch a worldview grounded in the idea of complex adaptive systems within which collaborative policy-making makes far more sense than in bureaucracies (Connick and Innes, 2001:6). To this end, the CMPP formulation and adoption process which took place between May 1997-June 2000, was an intensely participative process, involving both stakeholders and team members who designed and managed the program, and covered a geographic area of 13 coastal regions which reflect the diverse physical, biological, political, social, cultural and economic characteristics of the South African coast (Glavovic, 2006a: 895; Glavovic and Boonzaier, 2007: 4)

Olsen *et al.* (1998 cited in Olsen, 2003: 349) provides a framework for coastal governance and outcomes (Figure 4.3) on which many ICZM initiatives have been built on and elaborated. It comprises four Orders of Outcomes that group together the sequences of institutional, social and environmental changes that can lead to more sustainable forms of coastal development through collaborative policy dialogues (Connick and Innes, 2001:10; Olsen, 2003: 348). It highlights the importance of changes in state (of a resource or quality of life) while recognizing that for each change in state there are correlated changes in the behavior of key stakeholders within the sphere of influence of the management activity (Olsen, 2003: 348). Much of the South African CMPP builds on this policy dialogue framework.

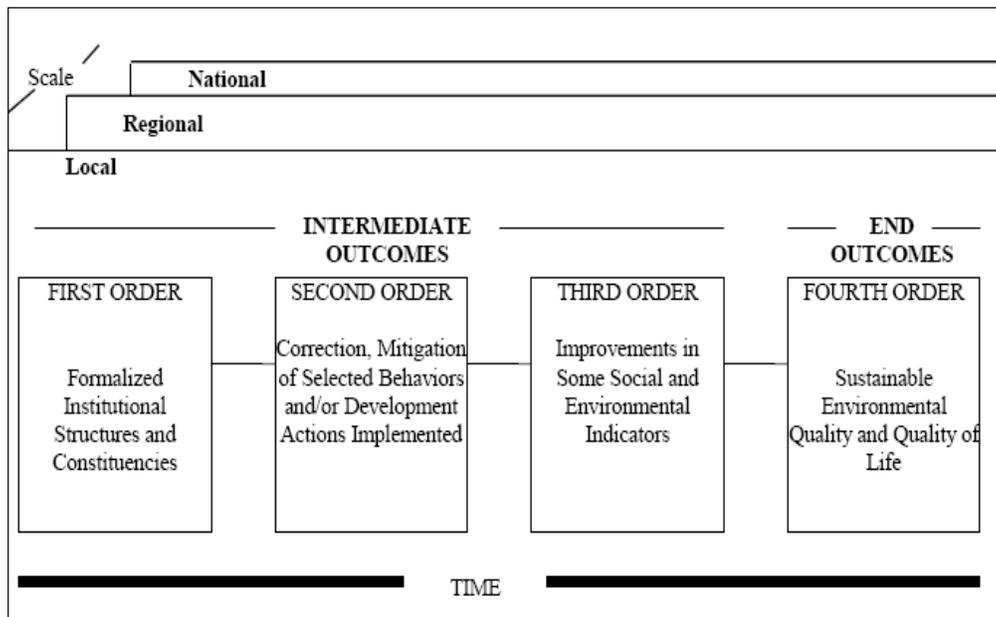


Figure 4.3 Four orders of coastal governance outcomes (Olsen *et al.*, 1998 adapted from Olsen, 2003: 349)

First-order effects occur during a dialogue itself and include the building of social, political and intellectual capital, agreements and innovative ideas and strategies (Connick and Innes, 2001: 10; Brody *et al.*, 2003: 246). For many programs, the first priority is to create a program that has the mandate, human and financial resources and political backing to begin practicing ICZM (Olsen, 2003: 349). According to Glavovic (2006b:

290), “the need to promote constructive opportunities for public participation was arguably the most important challenge in the policy-making arena in South Africa in the mid-1990s”. According to Haley *et al.* (1998: 13), where institutional capacity is lacking and inter-agency conflicts dominate, this is in itself a major undertaking. Some of the challenges included overcoming mistrust and deep divisions, language and cultural differences, different perceptions about the importance of coastal management, and varying levels of understanding of the coast and its management (Glavovic, 2006a: 894). However, the agreements reached in these deliberations laid the foundation for the CMPP.

Second-order effects, which tend to manifest within a year or two, although they begin to emerge in the process itself, include new partnerships and collaborative activities, coordinated and joint action, learning that extends into the larger community, changes in perceptions of problems and of other stakeholders, changes in practices, and implementation of agreements or strategies (Connick and Innes, 2001:10). Haley *et al.* (1998: 13) stress the importance of scale, claiming that successful and sustainable initiatives make good judgments of what they can reasonably hope to accomplish in any particular generation, so strategies need to be workable within the particularities of every portion of coast. The Coastal Policy Green Paper, which outlines formal Government policy, was drafted during this stage integrating public input and the findings of specialist studies (Glavovic, 2006a: 896). Furthermore, it was intended to provide the foundation for deliberation in subsequent stages, and hence was conceptualized as a capacity building tool rather than simply a draft policy document (Glavovic, 2006a: 896), and therefore provided a strong precursor to the White Paper for Sustainable Coastal Development in 2000.

The White Paper is founded on a shared national vision for the coast that deliberately confronts the legacy of apartheid and provides a value framework for reconciling short-term development needs with the longer term sustainability imperative (Glavovic, 2006a: 897). In contrast to previous efforts, the White Paper highlights the following (DEAT, 2000a: Executive Summary):

- The value of coastal ecosystems as a cornerstone for human development;
- It is people-centered, stressing the important contribution that sustainable coastal development can make to reconstruction and development;
- It views the coast as a system and advocates a holistic way of thinking by promoting ICM; and
- It advocates a new facilitative style of management that involves cooperation and shared responsibility with a range of stakeholders, is responsive to the diversity of the coast and learns from experience.

Furthermore, the White Paper's Plan of Action presents practical steps for developing and implementing an ICZM approach (Glavovic, 2006b: 992). After the Cabinet approved the White Paper a comprehensive legal review was carried out to determine whether the White Paper could be implemented in terms of existing laws (DEAT, 2006c: 3). The review concluded that a dedicated Coastal Management Act was required for implementing the White Paper (DEAT, 2006c: 3). To this effect, the NEMICMA builds largely on the White Paper.

Second Order changes in the behavior of organizations and user groups signify or determine third order socio-economic and environmental outcomes that mark physical evidence (indicators) of progress towards sustainable forms of coastal development (forth-order effects) (Olsen, 2003: 349). The achievement of measurable improvements in selected indicators of quality of life and the environment (such as fish stocks, water quality and income) are major accomplishments that bring credit to coastal management programs and justify the process by which they were achieved (Haley *et al.*, 1998: 13). However, Olsen (2003: 351) cautions that the attainment of sustainable forms of coastal development (balances and interdependencies between societal and ecosystem well-being) is an undefined ideal, and suggests that plans and programs which are adopted should be an iterative process as experience and success accumulates and will thus be capable of defining what this balance is and how it can be sustained.

According to Glavovic (2006b: 920), in his findings reflected in the article entitled: “Perceptions of South Africa's Coastal Policy Formulation Process”, the survey results reveal that “the CMPP succeeded admirably in achieving each of its main objectives”: overall, 93.4% of stakeholder respondents were 'supportive' or 'very supportive' of the policy proposals, and 77.7% were 'satisfied' or 'very satisfied' with their CMPP experience. CMPP team members reinforced this view. However, “much remains to be done to secure the necessary political will and build the capacity to move towards the elusive ideal of sustainable coastal development” (Glavovic, 2006b: 920).

#### **4.6 South African ICZM policy and legislation**

South Africa is currently undergoing an environmental law reform process, one of the objectives of which is to establish an integrated and internally consistent system of environmental laws for South Africa (DEAT, 2006c: 14). Some of the instrumental legislation governing the environment includes the Constitution Act (108 of 1996) which sets the overall framework for environmental management and decision-making in South Africa and supersedes all other legislation, particularly Section 24 which states that everyone has the right to an environment that is not harmful to their health or well-being and the right to have the environment protected for the benefit of present and future generations (DEAT, 2000a: 15).

The National Environmental Management Act (Act 107 of 1998) (NEMA) is currently advancing towards consolidating environmental legislation in South Africa, and includes a suite of legislation, such as the Biodiversity Act, Protected Areas Act and recently the NEMICMA. Accordingly, the NEMICMA has been drafted in a manner that will enable it to be implemented in conjunction with other environmental and land use planning legislation (DEAT, 2006c: 14). NEMA provides for cooperative governance by establishing principles for decision-making on matters affecting the environment and includes requirements for public participation, legal liability and financial accountability (DEAT, 1998: 2). The Act makes special reference to the coast in the following extract: “sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores,

estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure” (DEAT, 1998: 14).

The National Environmental Management: Biodiversity Act (Act 10 of 2004) was written to ensure the effective and sustainable management of natural resources, the strict protection of species and ecosystems, and to ensure that the benefits that flow from these resources are spread widely and fairly amongst the different communities (North West Provincial Government, 2004: 4). This Act regulates the protection and management of the natural environment for the benefit of people and in a manner that would preserve the ecological character of landscapes (North West Provincial Government, 2004: 4). Related to the Biodiversity Act is the National Environmental Management: Protected Areas Act (Act 57 of 2003) which provides for the declaration and management of protected areas in South Africa and the co-operative governance in such declaration and management of protected areas (North West Provincial Government, 2004: 4). Furthermore, applicable policies and programmes related to biodiversity include the National Spatial Biodiversity Assessment (NSBA) and National Biodiversity Strategy and Action Plan (NBSAP). The NSBA represents South Africa’s first national assessment of spatial priorities for conservation action, comprising four sub-reports which cover the terrestrial, river, estuarine and marine ecosystems respectively. Each report identifies the key conservation priorities for each component. These priorities then feed into the NBSAP, whose strategic objectives are as follows (NSBA, 2005 cited in Kuntunen-van ‘t Riet, 2007: 17):

- To create an enabling policy and legislative framework integrates biodiversity management objectives into the economy;
- To promote enhanced institutional effectiveness and efficiency ensures good governance in the biodiversity sector;
- To develop integrated terrestrial and aquatic management across the country minimizes the impact of threatening processes on biodiversity, enhances ecosystem services and improves social and economic security;
- To ensure that human development and well-being are enhanced through sustainable use of biological resources and equitable sharing of the benefits; and

- To create a network of protected areas that conserves a representative sample of biodiversity and maintains key ecological processes across the landscape and seascape.

The Marine Living Resources Act (18 of 1998) seeks to ensure the sustainable utilization of marine living resources, through scientifically-based and publicly acceptable operational management procedures (DEAT, 2000a: 16). The Act provides for a principle of national control and coordination (DEAT, 2000a: 16).

#### **4.7 National Environmental Management: Integrated Coastal Management Act (NEMICMA)**

Until recently, the legal context for CZM in South Africa was provided for largely by the Sea-shore Act (Act No. 21 of 1935). However, this Act was seen as largely outdated. The NEMICMA now repeals the Sea-shore Act in light of the need to address current realities of CZM in South Africa, to be consistent with other recent environmental and planning legislation, and to fill in existing gaps in the legislation (DEAT, 2000a: 15).

According to Anker *et al.* (2004: 504), successful ICZM goals and strategies demonstrate that management practices need to work in concert with legislation, planning and resource management across the coastline. Apart from the Marine Living Resources Act, most CZM is now legislated under the NEMICMA. The Sea Shore Act built on the Roman Dutch Law premise that ownership of the sea (the high seas, all marine waters under state jurisdiction and the sea bed) and sea shore (area between the high and low water mark) is vested in the President for the use and benefit of the public (DEAT, 2000a: 15). While the Sea Shore Act guaranteed the public status of the sea and sea shore by ensuring that they were inalienable, and established the principle of public heritage of the sea and sea shore, the Act did not address other issues such as the management of the Admiralty Reserve, found along the high water mark in certain sections of the coast and public access to the sea shore (DEAT, 2000a: 89).

Hence, the NEMICMA makes important changes to the legal status of the coastal zone (Freedman, 2006: 13), by building on both the deficit in the Sea Shore Act and the particular challenges facing South Africa's coastal zone (DEAT, 2000a: 15), which were identified by DEAT (2007) as: the consideration of the importance and implications of natural coastal processes, coastal access, pollution and cooperative government. In the Sea-shore Act, important coastal features such as beach and sand dunes which are located above the high water mark, and admiralty reserve (where it exists), were excluded from the definition of the sea-shore (Freedman, 2006: 11). According to NEMICMA (DEAT, 2008: 14), "admiralty reserve" means any strip of land adjoining the inland side of the high-water mark which, when this Act took effect, was state land reserved or designated on an official plan, deed of grant, title deed or other document evidencing title or land use rights as "admiralty reserve", "government reserve", "beach reserve", "coastal forest reserve" and "other similar reserve". The ownership of these areas was then, not vested in the President and therefore not subject to the provisions of the Act and accordingly not subject to management (Freedman, 2006: 11). This approach differs from that followed in other countries whose legal systems are based on Roman law, for example, France, Germany and Spain (Freedman, 2006: 11).

According to DEAT (2007), in the past, planning and developments did not adequately consider natural coastal process (wind, waves, currents) impacting on the beach and having significant implications for sediment movement, erosion, wind-blown sand along the coast, and sea level rise. These important processes present realities and challenges to management, especially due to the recent spate of storm damage to the coastline, for example, the March 2007 storm events to KwaZulu-Natal which resulted in severe erosion and property damage (DEAT, 2007). To this end, the NEMICMA includes new definitions and demarcation of the "coastal zone", which focus on regulating human activities within or that affect the coastal zone. According to UNEP (2001a: 18), the delimitation of the coastal zone is an essential part of the ICZM process which has been a subject of wide discussion, a requirement for the drafting of legislation and, importantly, one of the main reasons for the delay of many national coastal management initiatives.

NEMICMA defines the coastal zone as including coastal public property, coastal protection zone (previously referred to as the buffer zone but updated to align with planning terminology and includes coastal protected areas, special management areas), coastal access land (which the public may use to gain access to coastal public property), coastal waters, and any aspect of the environment on, in or under and above those areas. Coastal public property is made up primarily of the sea shore (between the low and high water marks) and coastal waters. Coastal waters are essentially all waters influenced by tides (whether in estuaries, harbors and rivers) and the sea out to the limits of the territorial sea (12 nautical miles) (DEAT, 2006c: 3).

The emphasis of coastal public property is at the center of the definition of the ‘coastal zone’, particularly in light of the limitations which the Sea-shore Act placed on the State’s power to deal with the sea or sea shore in the past. During the apartheid era, for example, regulations providing for the use of beaches and bathing by different race groups were made in terms of the Sea-shore Act itself as well as the Reservation of Separate Amenities Act (Freedman, 2006: 11). Despite the fact that these regulations clearly violated the public interest in the sea and the sea shore they were consistently upheld by the courts (Freedman, 2006: 12). The coastal protection zone, inland of coastal public property, has been demarcated to take account of the dynamic nature of the coast and important ecosystems that these areas contain, thus there is strong impetus for development control in this zone. The protection zone extends 100 m inland from the boundary of coastal public property (usually the high-water mark) in areas that have already been zoned for residential, commercial, industrial or multiple-use purposes, and one kilometer inland in other areas, but can vary on a case-by-case basis due to the varied sensitivities of the coast (not private property boundaries) (DEAT, 2007). NEMICMA also calls for the use of setback lines (s25) (DEAT, 2008: 42), and the control of certain activities via stricter EIA (s63) (DEAT, 2008: 80).

A further limitation of the Sea Shore Act was that it made no provision for physical access by the public to the sea or the sea shore, nor did it oblige owners of land above the high-water mark to grant members of the public access over their land to get to the sea

shore (Freedman, 2006: 12). This was particularly problematic given that most land which is adjacent to the sea shore is owned either by the State or by private persons (Freedman, 2006: 12). In order to improve access, the NEMICMA ensures existing access points and access strips over land (servitudes) are reinstated, it requires municipalities to demarcate access land and it enables expropriation if the property owner refuses to allow an access strip (servitude) or there is no existing access in the general area (DEAT, 2007).

The most crucial short-fall of the Sea Shore Act was that it did not provide a legal framework in terms of which a program of ICZM may be undertaken (Freedman, 2006: 12). For example, the Act's use of the high water mark as the landward boundary was considered insufficient for integration as pollution sources from land based activities usually extend further landward than the high water mark (Freedman, 2006: 12). According to Anker *et al.* (2004: 507), the extension of the territory on land (and at sea) should ideally be determined by the nature of the problems, which would be solved through the establishment of ICZM rather than by administrative criteria. Thus, the spatial definition of the coastal zone should be variable, so that it includes land areas with significant influence on water quality, fauna and flora in the sea territory and vice versa (Anker, *et al.*, 2004: 507). Furthermore, the Act made no provision for other key aspects of ICZM such as cooperative governance and cooperative government (Freedman, 2006: 12), thereby resulting in sectoral and fragmented planning and decision-making regarding the coast. For example, sewage outfalls constructed next to hotels and Blue Flag beaches, development allowed in flood-prone areas and development allowed in areas subject to coastal erosion; all indicating that planning usually stops at the high water mark (DEAT, 2007).

To this end, the NEMICMA has created an integrated (non-sectoral) institutional framework which includes wide representivity (Ch 5: ss35-43), which includes a national Coastal Committee, provincial lead agencies and Provincial Coastal Committees which will be responsible for coordinating coastal management in each province and voluntary coastal officers. This latter provision helps facilitate a new cooperative and participatory

approach to managing the coast by enhancing the participation of members of the public in coastal management (DEAT, 2006c: 7). Furthermore, the NEMICMA establishes new management and planning procedures for coastal resources to ensure that development is sustainable, integrated and in the interest of all user groups (DEAT, 2006c: 7), through the formulation of coastal management plans (CMPs) from a national to Municipal levels (each in accordance with the hierarchy of the plan at the level above it) and including a national estuarine management protocol. These are to be adopted a few years after the formal adoption of the NEMICMA. CMPs must include a vision for the management of the coastal zone they cover, set coastal management objectives (CMOs) and include priorities and strategies for achieving these and performance indicators that can be used to measure progress. At the municipal level, CMPs may proceed as either as stand alone documents or as part of an IDP prepared in accordance with the Municipal Systems Act (DEAT, 2006c: 8).

#### **4.8 Coastal tourism legislation**

The White Paper on Sustainable Coastal Development in South Africa (DEAT, 2000a: 5), states that coastal economic development potential on a national scale is attributed to two major drivers, directly related to coastal environments, which are: the access to international trade created by transport networks and ports, and the attractive lifestyle, recreational and tourism opportunities offered by a coastal location. It stands to reason that the maintenance of coastal economic development thus rests on the maintenance of a healthy and attractive coastal zone (DEAT, 2000a: 6). The National Tourism Act (72 of 1993) is the current legislation pertaining to tourism in South Africa. However, it does not include any specific reference to coastal and marine tourism (Vracken, 2009: 204). The national tourism policy is contained in the White Paper on the Development and Promotion of Tourism in 1996.

This White paper of 1996 noted that tourism had largely been “a missed opportunity for South Africa”, but considered that tourism could provide the nation with an “engine of growth, capable of dynamizing and rejuvenating other sectors of the economy”

(Spenceley, 2003: 6). It further recognized the potential economic importance of tourism in job creation and skills development, and its potential to generate foreign exchange, create export markets and provide opportunities for linkages across industry (Spenceley, 2003: 6). The White Paper of 1996 highlights the key constraint in tourism as soil erosion which is silting estuaries, thereby depriving them of aesthetic qualities able to attract and maintain tourism (DEAT, 1996 cited in Vrancken, 2009: 204). However, it also highlights that a well managed tourism industry has the potential to contribute to tourism in positive ways (DEAT, 1996 cited in Vrancken, 2009: 204). Although tourism as a distinct activity is not mentioned in the NEMICMA, the White paper on Sustainable Coastal Development in South Africa highlighted that promoting coastal tourism, leisure and recreational development was identified as one of the priority issues in the coastal policy formulation process (Vrancken, 2009: 204).

#### **4.9 Conclusion**

This chapter summarizes the findings on the ICZM policy formulation process in South Africa which has recently culminated in a national ICZM Act. It draws both on the unique South African management and legislative perspectives, as well as management practices of international experiences with ICZM to inform necessary changes. The institutional framework is seen as the central issue that may either facilitate or obstruct ICZM since ICZM essentially is about making well-balanced and informed decisions about the use and protection of coastal resources. The South African experience identifies several weak points in the past legal and regulatory framework and in management practices, the key issue being lack of integration. The NEMICMA builds on integration, comprising new definitions of the coastal zone that includes land and sea areas, coastal planning requirements as well as public participation.

## CHAPTER 5

### Study Area and Methodology

#### 5.1 Introduction

At the onset of a developmental resurgence, and the enactment of the National Environmental Management: Integrated Coastal Management Act (NEMICMA), the KwaZulu-Natal north coast of South Africa is positioned for creating sustainable growth opportunities. This chapter addresses the background to the pertinent issues in the study area, then describes the methodological approach used for the development of a strategic environmental assessment (SEA), thought to be useful as a decision support tool for coastal managers in KwaZulu-Natal. Since coastal zones comprise strong social systems, which superimpose upon and interact with natural systems, this chapter works within a framework of an integrated systemic assessment methodology. The methodology combines the social and natural sciences, adopting an informed interdisciplinary approach as discussed in Chapter two, and underscores the essential role played by stakeholder participation.

The NEMICMA is the legal framework within which ICZM will be carried out in South Africa, and land use planning is a key component of this management. Land use activities will require an environmental assessment. This thesis tests whether an SEA can inform such land use decisions. The methodology targets three main land use indicators (use, function and perception) in its attempt to achieve integration in land use decision-making, which typically considers the interactions between societal activities and biodiversity issues along the coastline (Table 5.1). The term 'biodiversity' is restricted to its most commonly used form, which is species diversity (Stoms and Estes, 1993 cited in Nagendra, 2001: 2378). In this study, several terms (ecosystems, habitats, landscape elements and vegetation communities) have been used more or less synonymously.

Participatory methods were used in this study, primarily focus groups which, in order to render credibility and reliability to the responses, were combined with other quantitative

and qualitative methods, as part of an integrated impact assessment. These relate to the use of semi-structured questionnaires which were administered to a purposive sample of six key stakeholder interest groups within the study area. A spatial analysis of land use and cover change was employed to determine baseline conditions, changes in the state of key ecosystems from 2000 to 2008, key development drivers and emerging threats.

Table 5.1 Key land use indicators and methods (adapted from Neale, 2003: 4)

<i>Land use</i>	<i>Indicator</i>	<i>Method</i>	<i>Instruments</i>
Use	Past, present use and change	Time-series spatial analysis of land use/cover change Participatory methods Policy and institutional review	Remote sensing classification of satellite imagery and generation of maps in a GIS\ Participatory mapping Focus group discussions Desktop analysis
Function	Key ecological processes of ecosystems	Key informant Secondary data	Semi-structured interviews
Perception	Stakeholder analysis of perceptions of space and its relationship to their daily lives	Participatory methods	Focus group discussions Participatory mapping

Furthermore, the study utilized a policy review and institutional analysis to determine the key drivers of land use decision-making (including sectoral, economic development and biodiversity policy) in an attempt to develop a conceptual model of socio-economic biodiversity drivers and pressures. Although tourism was selected as the main economic driver pressuring the coast, recommendations for management should be cross-sectoral with other human pressuring activities such as property development in general. Secondary data was used to support findings, and comprised the 2007 South African census data for the specific wards in the study area, specialist reports, various Coastal Management Plans (CMPs) and local area plans, and key national and provincial policies applicable to the study area. The results were analyzed in MS Excel and Geographic Information Systems (GIS).

## 5.2 Study area

The main study area lies within a portion of the coastline of the KwaZulu-Natal north coast, stretching from Umhlanga Rocks in the south to Zinkwazi in the north and up to the N2 national road in the west (Figure 5.1). The Indian Ocean marks the study's eastern boundary. The study area comprises an area of 38 813 ha (Figure 5.1).

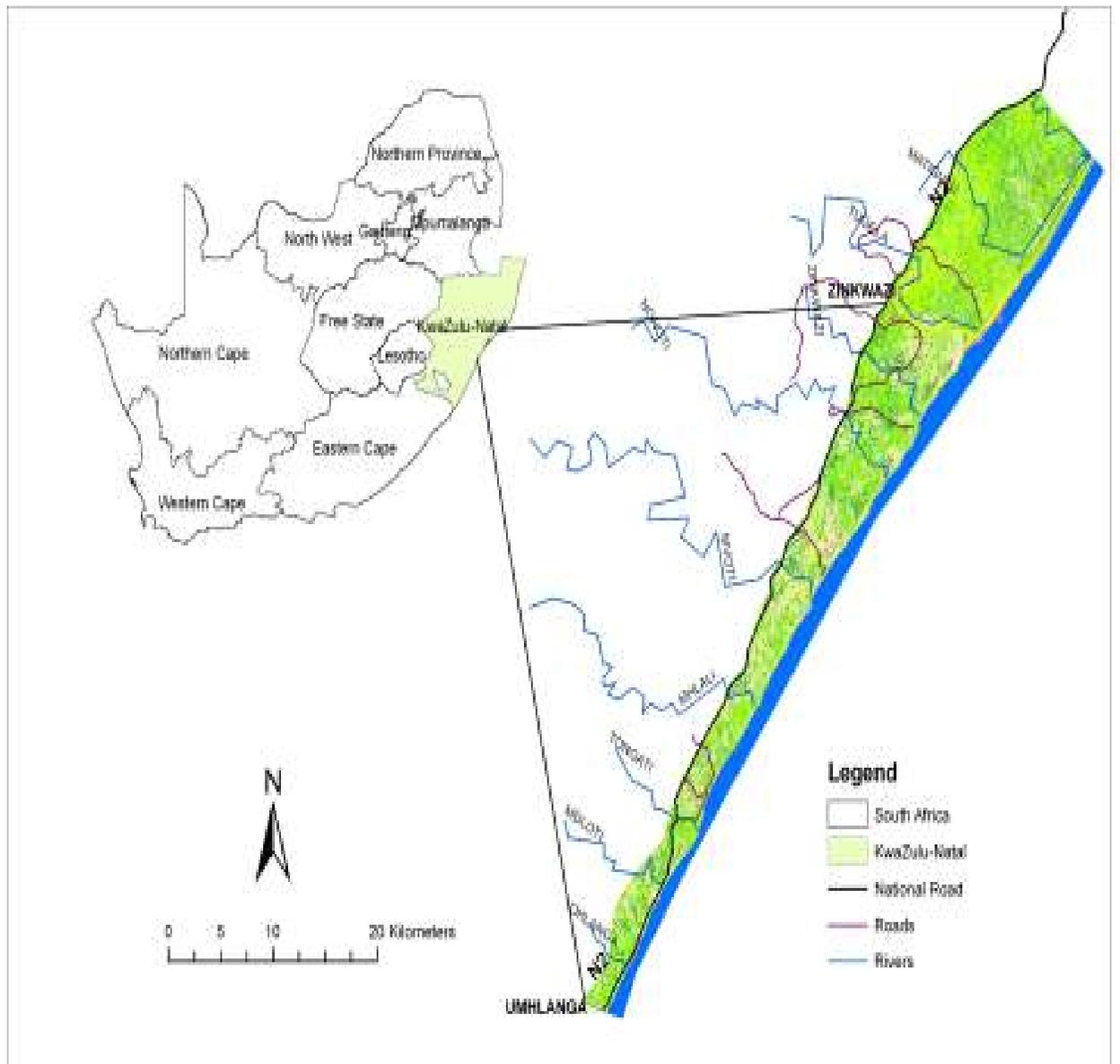


Figure 5.1 Map of the study area

The study area straddles two local coastal municipal areas, these being the eThekweni municipality and the Ilembe District municipality (Figure 5.2). The eThekweni portion of the study area includes the following coastal towns (from south to north): Umhlanga, Umdloti, La Mercy and Tongaat) while the Ilembe portion covers the towns of Ballito, Salt Rock, Sheffield Beach, Tinley Manor, KwaDukuza, Blythedale and Zinkwazi (while these towns do not appear in figure 5.2, they are contextualized in this chapter as they are mentioned in the analysis). Within the Ilembe District Municipality, lies the local Municipalities of KwaDukuza, eNdongakusuka, Ndwedwe and Maphumulo. The first two have access to the coast and have been included in the study.

There are distinct settlement patterns within the study area that are in stark contrast to areas falling out of its boundaries. Settlement patterns within the study area reflect development associated with high-income type developments linked primarily to eco-estate developments, while the surrounding settlements (to the west of the N2) are largely low-income, and as ones moves into the hinterland, middle-income settlements follow.

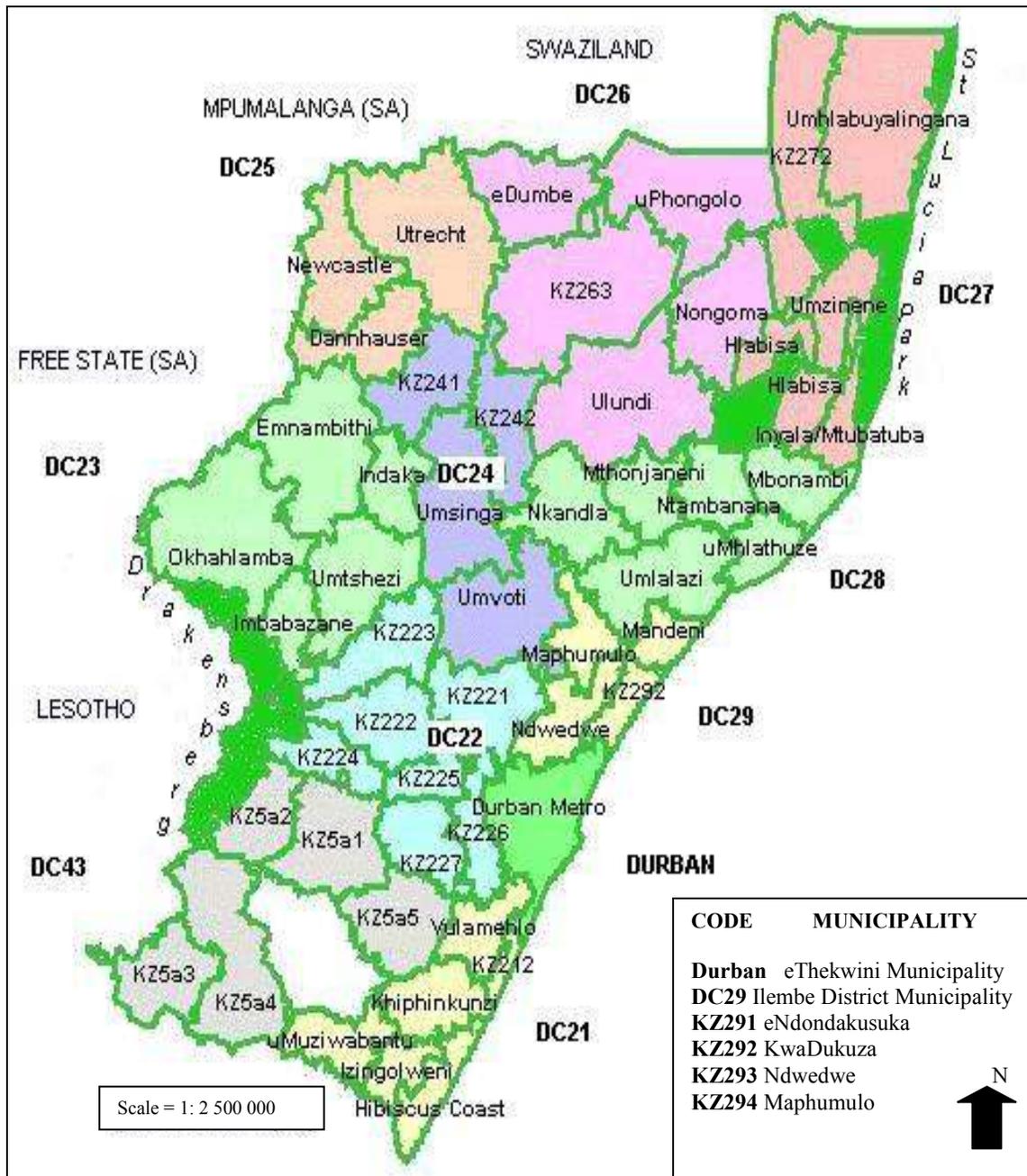


Figure 5.2 Local coastal municipalities in the study area (along with other KwaZulu-Natal municipalities and surrounding South African provinces or countries, adapted from Australian South Africa Local Governance Partnership, 2002: Annexure A)

Where necessary, the study area has been extended slightly inland of the N2 western boundary and along the northern coastline to include areas which are significant from a biodiversity and/or development point of view. In this case, the area includes the new King Shaka International Airport (KSIA) and adjacent Dube Trade Port (DTP) site in Mt Moreland, which has severe implications for the study area in terms of both biodiversity and developmental issues (Figure 5.3). According to the Institute of Natural Resources, the KSIA will have the capacity to handle 6.2 million passengers per annum in 2015 and a 3 700 m runway that will accommodate large aircrafts (Institute for Natural Resources - INR, 2007: 11). The Trade Port will include three zones: a Trade Zone (with cargo terminal, processing and storage facilities and a logistics hub which will increase the competitiveness of the area), a Support Zone (several nodes where land will be released for the development of offices, business parks, commerce and hotels by the private sector) and an Agri Zone (that includes land for the cultivation of high value farming products and facilities to promote agricultural production and export) (INR, 2007: 11).

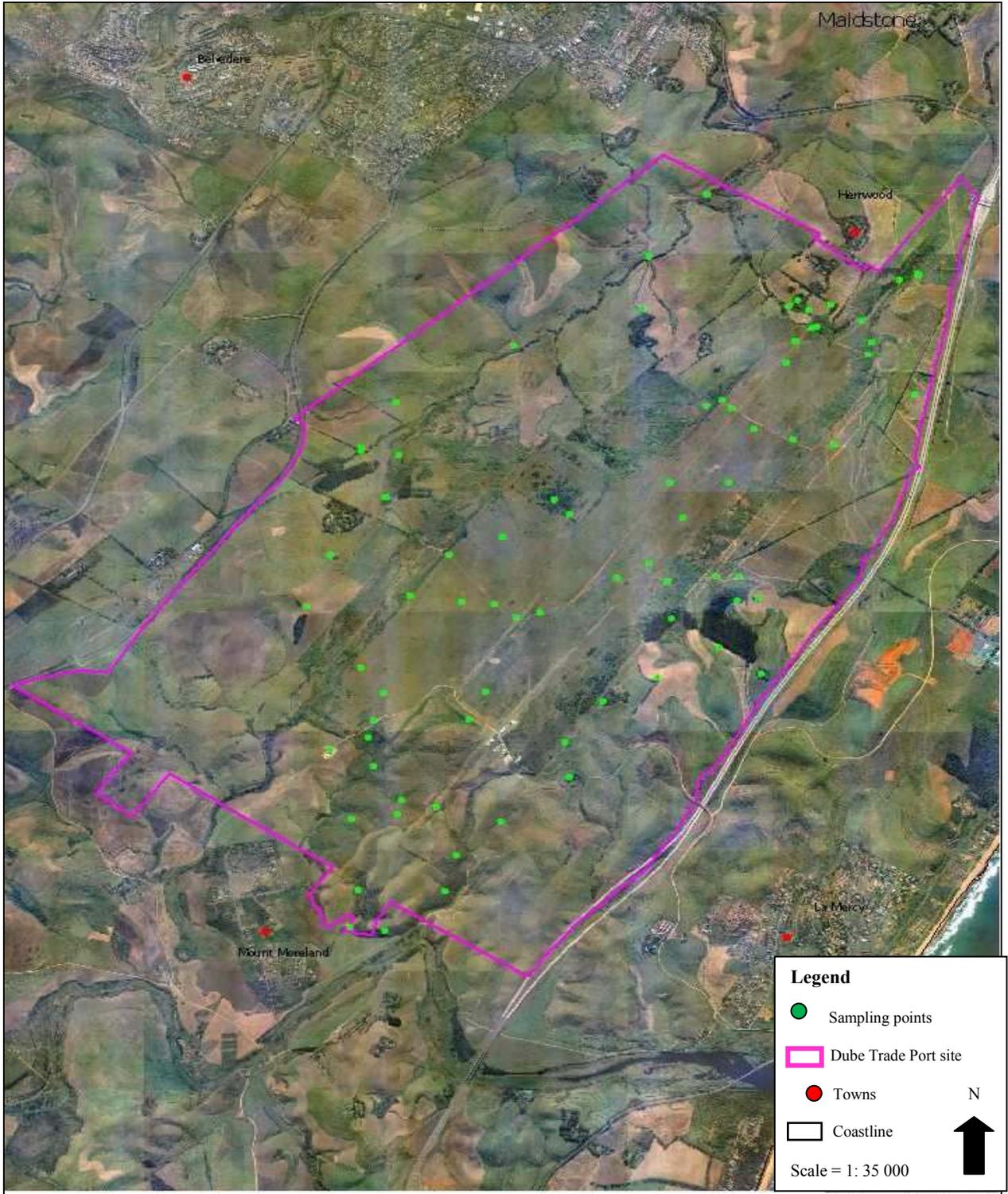


Figure 5.3 Dube Trade Port (DTP) site (Hines and Nichols, undated: 6)

### 5. 2.1 Climate, soils and hydrology

The mean annual rainfall range for the north coast of KwaZulu-Natal is between 825 mm and 1 272 mm (Camp, 1999: 23), of which 60% falls during the summer months (Hatcher, 1993 cited in Hatcher, 1999: 6). The mean annual temperature ranges between 19.4°C and 21.1°C, with a mean annual evaporation rate of between 1 638 mm and 1 771 mm (Camp, 1999: 23). This sub-tropical climate is a major determining factor which makes this coast attractive in terms of recreation and tourism (Jones, 1994: 4).

According to Mucina *et al.* (2006 cited in Mucina and Rutherford, 2006: 578), the KwaZulu-Natal coastal belt (within the study area) consists of Ordovician Natal Group sandstone, Dwyka tillite, Ecca shale and Mapumulo gneiss (Mokolian). Furthermore, due to weathering of old dunes, portions of the study area are situated on Recent Sands of the Berea Formation (Mucina *et al.*, 2006 cited in Mucina and Rutherford, 2006: 578). Due to the nature of the soils and climate, the entire study area is highly suited for agricultural production, of which, commercial sugarcane is the predominant within this category (Camp, 1999: 24). The soils making up most of the landforms in the area are sandy with low cohesion and are highly erodible, unless bound by vegetation or otherwise protected (VKE Consulting Engineers, 2005: 8).

The study area is drained by a number of rivers including the Ohlanga, Mdloti, Tongati, Mhlali, Mvoti, Nonoti, Zinkwazi, Tugela and Matigulu Rivers. Although just north of the study area, the Tugela is a significantly large river, around which many new developments are planned. There has been concern about the condition of South African estuaries since the 1970s, when it was already noted that few estuaries remained in their natural state, particularly in KwaZulu-Natal (Begg, 1978; Morant and Quinn, 1999 cited in Turpie, 2004: 6). Siltation was the greatest culprit, due to intensive sugarcane cultivation in the catchments and reduction in flow was also recognized as a problem (Turpie, 2004: 6).

Goodman (2005) presents the following status of KwaZulu-Natal's estuaries:

- 11 of KwaZulu-Natal's estuaries are considered nationally important;
- Other than in Maputaland, KwaZulu-Natal's estuaries are considered to be in fair to poor health. Approximately 20 of KwaZulu-Natal's 76 estuaries are considered to be degraded; and
- Nine of KwaZulu-Natal's estuaries are protected or partially protected, but no specific measures are in place to protect or manage their catchments. Thus, protected estuaries do not adequately preserve estuarine biodiversity and processes.

### **5.2.2 Biodiversity**

The study area falls within the Maputaland/ Pondoland Center of endemism and is also significant internationally, from a biodiversity perspective (Goodman, 2005) (Figure 1.1). Mucina *et al.* (2006 cited in Mucina and Rutherford, 2006: 578) describe the study area as highly undulating, comprising plains that were once covered, to a great extent, by subtropical coastal forest. The authors claim that currently only remnants of this vegetation type exist. Jones (1994: 6) stated that these remnants were limited to only four sizeable indigenous forests: Hlongwene (South of the Tugela River, which is to the north of the study area), Zimbali (south of Ballito), an unnamed patch south of the Tongati River and Havaan forest in Umhlanga (the southernmost portion of the study area). However, Mucina *et al.* (2006 cited in Mucina and Rutherford, 2006: 578) claim that this vegetation type is now largely confined to the Havaan and Umhlanga Lagoon areas. According to Ferguson (2007: Appendix 9), the Department of Water Affairs and Forestry (DWAf), are busy finalizing a systematic conservation plan for South Africa's forest biome, where 24 broad forest types in South Africa have been the subject of a Red listing exercise. Furthermore, DWAf found that the KwaZulu-Natal Dune Forest (the same type as the Umhlanga and Havaan Forests) is one of the 24 types and has been categorized as Critically Endangered (Ferguson, 2007: Appendix 9).

Furthermore, the grassland status within the study area is also of concern. Rouget *et al.* (2004: 85) present the following grassland types and their conservation status:

- KwaZulu-Natal Coastal Belt: endangered – where less than 40% but more than the target amount of the original area of the vegetation type remains untransformed, according to Goodman (2005);
- KwaZulu-Natal Highland Thornveld: least threatened - where more than 60% of the original area of the vegetation type remains untransformed, according to Goodman (2005); and
- KwaZulu-Natal Sandstone Coastal Sourveld (endangered).

These vegetation types are, furthermore, hardly to poorly protected (Rouget *et al.*, 2004: 85).

Goodman (2005) also highlights the status of significant faunal species in KwaZulu-Natal, some of which occur in the study area (Table 5.2). Many of these species require a combination of different habitats (vegetation types) to meet their cumulative ecological requirements.

Table 5.2 Status of fauna in the Maputaland/Pondoland Center of endemism (Goodman, 2005)

<b><i>Group</i></b>	<b><i>Endemic</i></b>	<b><i>Critically endangered</i></b>	<b><i>Endangered</i></b>
Invertebrates	116	Not available	2
Amphibians	2	0	2
Reptiles	9	Not available	Not available
Birds	0	1	3
Mammals	0	1	5

Significant threatened species identified in the study area include the following (Strategic Environmental Focus, 2006: 5):

- Threatened mammals: Shrews (*Crocidura spp.* and *Myosorex spp.*), Blue Duiker (*Philantomba monticola*), Single-striped Mouse (*Lemniscomys rosalia*), Water Rat (*Dasymus incomtus*) and Bats (*Order: Chiroptera*);
- Amphibians: Spotted Shovel-nosed Frog (*Hemisus guttatus*), Natal Leaf-folding Frog (*Afrixalus spinifrons*) and Pickersgill's Reed Frog (*Hyperolius pickersgilli*);

- Reptiles: Mashona Hinged Terrapin (*Peliosios rhodesinaus*), Southern African Python (*Python natalensis*) and Forest Cobra (*Naja melanoleuca*);
- Bird Species: Spotted Ground Thrush (*Zoothera guttata*), Pinkbacked Pelican (*Pelecanus rufescens*), Pelican (*Pelecanus onocrotalus*), Mangrove Kingfisher (*Halcyon senegaloides*), African Marsh Harrier (*Circus ranivorus*), Woollynecked Stork (*Ciconia episcopus*), African Crowned Eagle (*Stephanoaetus coronatus*), Broad-tailed Warbler (*Schoenicola brevirostris*) and Black-throated Wattle-eye (*Platysteira peltata*) and Crested Guineafowl (*Guttera pucherani*); and
- Invertebrates: *Heteracris zulu* (*Acrididae: Eyprepocnemidinae*) and *Sphecodemyia natalensis* (*Diptera: Tabanidae*).

### 5.2.3 Coastal risk

Several types of coastal risks exist in the study area and include the possible impacts from the predicted sea level rise (for Durban) of 2.7 mm $\pm$ 0.05 mm per year (Mather 2007 cited in KwaDukuza Coastal Management, 2008: 5). In addition, Smith *et al.* (2007 cited in KwaDukuza Coastal Management, 2008: 5) have identified a return basis of 10 - 12 years for storm events resulting in extensive removal of beach sands and coastal retreat. The risk to society, in the form of damage to lives and infrastructure, and the health and financial implications of damage to coastal infrastructure such as roads are other important issues that are linked to predicted sea level rise. For example, “the negative impact of such sea level rise on existing infrastructure, including the sewerage network of coastal Ballito which already lies *de facto* below sea level, will be exacerbated” (KwaDukuza Coastal Management, 2008: 5). Furthermore, damage to infrastructure to stormwater and sewer infrastructure could have serious implications for water quality and marine biodiversity and could impact negatively on tourism potential in the area. These issues also have urgent implications for management intervention and perhaps institutional strengthening. Figure 5.4 below is a schematic representation of the types of coastal risks presented in the southern portion of the study area (Umhlanga to Tongaat).



and forestry and water supply and to its extensive transport infrastructure (in particular the ports of Durban and Richards Bay which are not only South Africa's biggest ports but are also amongst the busiest ports in the southern hemisphere) (Graham Muller Associates, 2006: 11). The study area is strategically situated between these two ports, in what is referred to as the eThekweni/ Umhlatuze provincial priority corridor (PC) (Figure 5.5). Spatial corridors (SC), on the other hand, transcend provincial boundaries.

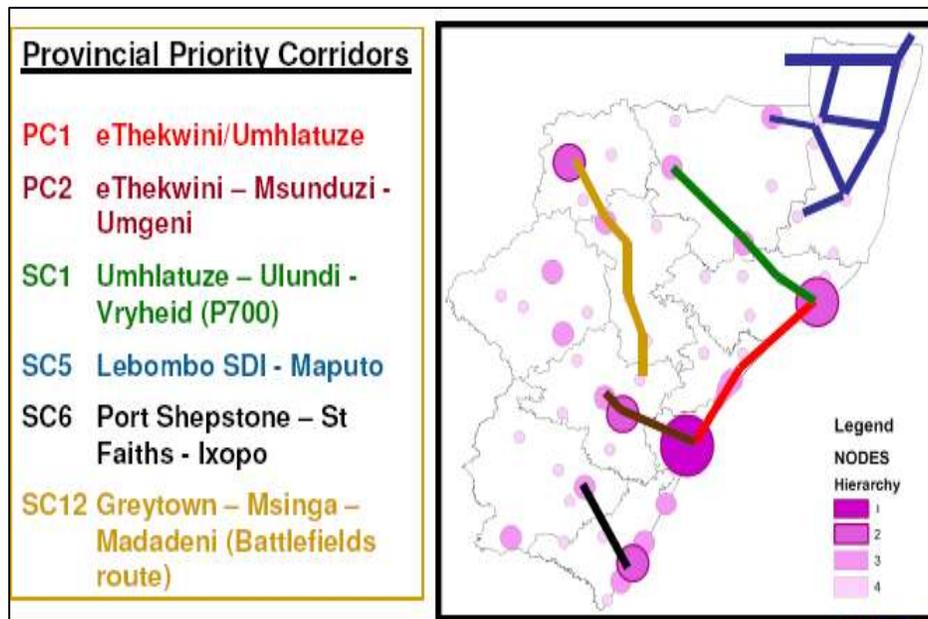


Figure 5.5 Provincial priority corridors for KwaZulu-Natal (City of Umhlatuze, 2008: 5)

Furthermore, the pace of economic growth within the study area as witnessed in terms of the trade, transport, real estate (and especially the residential sector) and finance sectors has contributed to a general optimism for the continued economic growth in the area (Celliers and MacKay, 2005: 1). The high income residential sector performance has been spectacularly prolific, with small resort towns surrounded by commercial agriculture (sugarcane), giving way to large-scale green-fields developments such as eco-estates.

According to Hamadziripi and Sishi (2008: 6), although KwaZulu-Natal is the biggest province in South Africa in terms of population (9.6 million people) there is no economic relationship between population and employment creation. The reason for this is because KwaZulu-Natal has a well developed tertiary /manufacturing sector (contributing to 53% of KwaZulu-Natal's GDP in 2004), but a small primary and government service sector (Graham Muller Associates, 2006: 6). This situation can be explained by the fact that the majority of the workforce in KwaZulu-Natal is unskilled for tertiary sector employment. According to Graham Muller Associates (2006: 8), 72% of the KwaZulu-Natal workforce is black and this segment of the population is over-represented in the unskilled occupation categories, holding over 95% of these positions. In addition, the price of labor of the poor is pushed up by the fact that many live a great distance from their places of work. Hence, the government's effort to halve poverty and unemployment by 2014, as specified in the Accelerated and Shared Growth Initiative for South Africa (ASGISA) and the National Spatial Development Perspective (NSDP) (Hamadziripi and Sishi, 2008: 11).

The NSDP (2003: 5) identifies four key categories of development potential, including:

- The agricultural sector (including agri-processing) and land reform;
- The industrial sector;
- The tourism sector, primarily the catering and accommodation sector which outperformed the national economy in terms of annual growth (Graham Muller Associates, 2006: 28); and
- The service sector (including government services)

The phenomenal growth in these sectors, are stimulating demand in other sectors such as housing (with new demands for low and middle income housing), office parks and business parks.

### **5.2.5 Tourism**

According to the Global Competitiveness project (South African Tourism, 2004: 27) tourism is the top performing sector in South Africa (Figure 5.6), relative to other sectors of the economy.

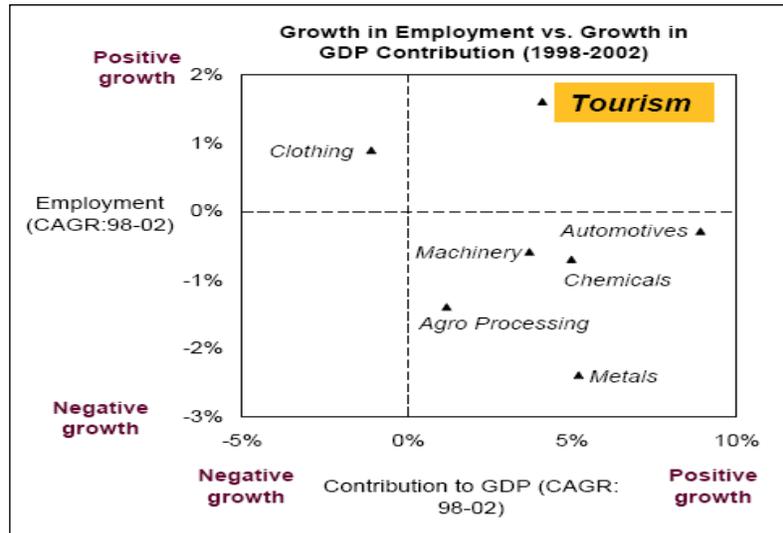


Figure 5.6 Tourism’s contribution to GDP in South Africa: 1998-2002 (South African Tourism, 2004: 27)

In terms of KwaZulu-Natal, the north coast ranks in the top five as a tourist destination for domestic tourism (Figure 5.7). Furthermore, the activities undertaken by domestic tourists indicate that 65% of the tourist preference for forms of tourist ‘experience’ is related to beach (the sun, sea and sand phenomenon) tourism (TKZN, 2008: 9). The foreign tourist component comprises visitors primarily from the northern countries (approximately 1.4 million per annum), who inject approximately R7 billion annually to the economy (South African Tourism - SAT, 2008 cited in TKZN, 2008: 9).

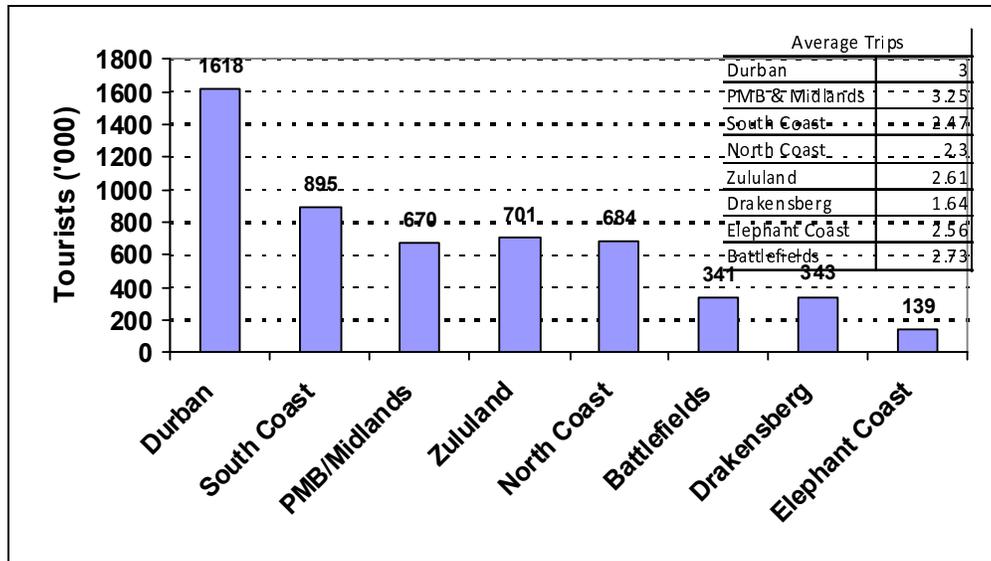


Figure 5.7 Domestic tourism visitation destinations in 2007 (TKZN, 2008: 9)

### 5.2.6 Pressures on the coastal environment

Coastal natural resources in the study area are highly transformed, under-conserved and compromise free ecosystem goods and services (Goodman, 2005). Mucina *et al.* (2006 cited in Mucina and Rutherford, 2006: 575) identify the following threats to natural land cover in the area:

- Cultivation and afforestation of small-scale sugarcane and commercial tree farming, which are supported by government water supply schemes and other agricultural incentives;
- Alien plant invasions, which compete with and threaten indigenous vegetation, and which diminish browsing and grazing land for wildlife. *Chromolaena odorata* is the main problem plant; and
- Urban and industrial expansion which is spreading into the few remaining natural areas.

These pressures are in direct contradiction to both national and provincial strategies and legislation to incorporate sound environmental principles into strategic and land use planning (Goodman, 2005).

### **5.3 Research methods employed in the study**

This research draws attention to the importance of using both qualitative and quantitative methods of data collection and analysis. For this research, the qualitative methods employed the use of focus group discussions, a policy and institutional review, participatory mapping and semi-structured interviews to key informants. The quantitative method employed a time-series analysis of land use/ cover change. These will be discussed in detail later in the chapter.

The planning of the research, with regard to the selection of the potential respondents who could contribute to the gathering of relevant information, was based on two rationales:

- Firstly, the people that would be appropriate for the purposes of the research should have participated in coastal management and environmental assessment procedures in KwaZulu-Natal, so that they would be experienced and well informed in coastal management issues; and
- Secondly, that the respondents should be members of different groups, since different perspectives and roles in the implementation of coastal management enhances the quality of research, through transcending disciplinary, racial, social and educational confines, which is particularly significant in the South African coastal zone.

Therefore the search for appropriate respondents focused on the following stakeholder groups: local coastal managers (both provincial and local), tourism professionals, environmental experts and developers, who comprised the key informants for this research. General Interested and Affected Parties (I&AP) (community-based organizations, consultants, a Ratepayers Association and a Property Owners Association) participated in two separate focus group discussions, one from the Ilembe district municipality (Focus group 1) and the other from the eThekweni municipality (Focus group 2), in an attempt to elicit perceptions on the similarities and/or differences in use and function of this coastal zone. The academic stakeholders (Focus group 3) formed the last group in relation to the focus group discussions undertaken for this study. The semi-structured interview and focus group schedules appear in the Appendices of this study.

Data collection was conducted between September 2008 and July 2009. Data collection methods varied due to time and researcher availability constraints. Table 5.2 indicates the stakeholder groups targeted and their level of response. The technique used to identify suitable informants was that of purposive sampling, a non-random sampling method where targets meet the criteria for inclusion in the sample.

Table 5.3 Stakeholders contacted and level of response

<i>Stakeholder group</i>	<i>Number contacted</i>	<i>Method of contact</i>	<i>Number responded</i>	<i>% of respondents</i>
Coastal area managers (Key informants)	20	Face-to-face interviews Telephonically E-mail	13	65
Tourism stakeholders (key informants)	10	Face-to-face interviews Telephonically E-mail	10	100
Environmental experts (key informants)	10	Face-to-face interviews Telephonically E-mail	10	100
Developers (key informants)	20	E-mail	4	20
I & APs	50	Focus group 1 (Ilembe stakeholders) Focus group 2 (eThekweni stakeholders)	30	60
Academic stakeholders	20	Focus group 3	10	50
<b>Total sample</b>	<b>130</b>		<b>77</b>	<b>59.2</b>

The target population for this study was 130 persons as illustrated in Table 5.3. With the exception of developers (only 20% responded or participated), in relation to the rest of the stakeholders identified in excess of half of the targeted population (59.2% in total) responded in written form and/or participated in the focus group discussions.

#### 5.4 Quantitative and qualitative methods

Generating primary data requires consideration of whether to generate qualitative or quantitative data, or a combination of both. Both qualitative and quantitative research “exhibits a set of distinct but contrasting preoccupations reflected in epistemologically grounded beliefs about what constitutes acceptable knowledge” (Bryman, 2004: 75). Qualitative research provides an interpretation of the social world of research participants by focusing on their “experiences, perspectives and histories” (Ritchie and Lewis, 2003: 3) and thus privileges their constructed realities when reporting social science research findings. Conversely, quantitative data are generally structured and consists of numbers or empirical facts that are easily ‘quantified’ and analyzed using numeric (statistical) techniques (Kitchen and Tate, 2000: 40).

Qualitative survey methods gained prominence in development projects during the 1980s, primarily in response to the drawbacks of quantitative questionnaire-type surveys, which were considered time-consuming and expensive, and not suitable for providing in-depth understanding of an issue (Marsland *et al.*, 2001: 1). Hence, the result was a polarization in collection and analysis of information with ‘formal’ quantitative techniques on the one hand and ‘informal’ qualitative methods on the other. However, this polarization of approaches and the associated shortcomings in findings and quality of information prompted researchers to realize the value of the complementarity between the two approaches in the latter part of the 1990s (Marsland *et al.*, 2001: 1). For example, while qualitative tools capture detailed, rich and contextual perspectives, they can be messy, time-consuming and difficult to administer consistently (Donner cited in Krueger *et al.*, 2001: 24). On the other hand, quantitative surveys can be clear and methodical, but also oversimplified and rigid (Donner, 2001 cited in Krueger *et al.*, 2001: 24). Certain situations call for an approach that combines the richness of interviews with the standardization of a survey.

The objective of proposing the present methodology in this study is to attempt to link the social and natural/ physical sciences given the complexity of the issues under examination. For the purposes of this study only the context specific methods and

techniques will be discussed in further detail. Qualitative participatory research is what largely guided this methodology and included the use of a policy and institutional review, questionnaire surveys to illicit key stakeholder opinion, focus group discussions and although the time series involved quantitative aspects, they were informed and complimented with participatory mapping methods. In essence, the adoption of triangulation, the use of multiple methods, was used in this study.

## **5.5 Participatory research**

Laderchi (2001: 3) highlights the shifts that have characterized the debate on participation. In the 1970s, it was linked to “popular participation” as an important constituent of rural development and basic needs strategies. In the 1980s it became associated with discourses of grassroots self-reliance and self-help, with NGOs often having to fill in the void left by a retreating State as a consequence of neoliberal reforms. The 1990s saw participation being advocated on a larger scale, beyond the boundaries of project or grassroots interventions to other spheres of social, economic and political life where participation came then to be seen as a tool towards important policy objectives such as “empowerment” and “good governance” (Laderchi, 2001: 3). Krueger *et al.* (2001: 1) concur by stressing the increasing importance being attached to facilitating dialogues among stakeholders in development projects and programs, to development interventions, and to increasing the voice of stakeholders in policy-making at all levels. Given the diversity of functions and users of coastal zones, management can become mired in conflict and disagreement. It is therefore necessary to engage stakeholders to promote solutions that command broad agreement and are likely to be successfully implemented (Brown *et al.*, 2001).

### ***5.5.1 Policy and institutional review***

Verhagen (1998: 2) defines policy analysis as “an inquiry whose purpose is to assist decision-makers in choosing a preferred course of action from among complex alternatives under uncertain conditions”. Here, ‘complex’ refers to the plurality in alternatives, different knowledges of the issue, and the gap between those who analyze

and those who decide (Verhagen, 1998: 2). In addition, environmental decisions operate on different levels of policies where conflicts may arise because the differences in objectives and goals pursued by the policy units, for example, decisions at national level could not satisfy the values and perceptions of the policy units at local level (Luiten, 1999 cited in Vazquez, 2003: 2). Furthermore, policy analysis exists in a complex framework with links between related fields, which affect and are affected by other policy areas. For instance, biodiversity policy relates strongly with environment, agriculture and tourism. According to Vazquez (2003: 2), a deep analysis and decision-making processes require a good background in environmental, economic and social disciplines. Furthermore, Elliot (2002 cited in Vazquez, 2003: 2) underscores the paradox in that the scientific community is mostly working on very detailed and more narrow aspects whereas managers require a holistic and ecosystemic approach, not necessarily at a high level of detail.

The word ‘uncertain’ emphasizes that the decision-makers must generally make choices on the basis of incomplete knowledge, among other alternatives that could manifest in the future and that alternatives must be compared not only by their expected consequences but also by the risks of being wrong (Verhagen, 1998: 2). Furthermore, Brans (2002: 342) denotes that decision problems concerning environmental and natural resources management are usually complex or even hyper-complex in nature. This is no more significant than in the coastal zone. Coastal ecosystems are increasingly becoming threatened by short-sighted management policies that focus on human activities and socio-economic benefits rather than the dynamic systems that underpin these (Kitsiou *et al.*, 2002: 1). The early assessment of the impacts of human activities (at a strategic level) on the quality of the environment in coastal areas is thus important for decision-making, particularly in cases of conflicts and pressures resulting in natural resource degradation and saturation in tourist areas (Kitsiou *et al.*, 2002: 1).

The purpose of the methodology proposed in this study is to support the assessment of policy analysis in order to measure how a specific policy meets the objectives established by the policy units/ actors. The policy review consisted of relevant official documents

aimed at a strategic level. These policies applied to the role of national government policies as drivers of land use transformation in the study area. Significant provincial and local plans are also reviewed. The collection of the documents was undertaken through the internet (official websites) and on *ad hoc* visits to government and other institutions. The policies examined include:

- *National Framework*  
Accelerated and Shared Growth Initiative (ASGISA) – 2006;
- *Provincial Framework*  
KwaZulu-Natal Provincial Economic Development Strategy (PEDS) – 2006;
- *Local Frameworks*  
Integrated Development Plans; and
- *Biodiversity policy*  
National Spatial Biodiversity Assessment - 2004

The policy and institutional review was conducted with the intent to develop a conceptual framework (response) to analyzing the links between socio-economic drivers, pressures and impacts relating to biodiversity change.

### ***5.5.2 Focus group discussions (Appendix II and Appendix III)***

Denzin and Lincoln (1994: 365) state that “Merton *et al.* coined the term ‘focus group’ in 1956 to apply to a situation in which the interviewer asks group members very specific questions about a topic after considerable research has already been completed”. Furthermore, Kreuger (1988: 18) defines a focus group as a "carefully planned discussion designed to obtain perceptions in a defined area of interest in a permissive, non-threatening environment." This approach was used in this study in that a focus group schedule was used. An additional strength of focus groups as articulated by Knodel (1993 cited in Borghi *et al*, 2007: 531) is that they are a more straight forward approach to explore a broad spectrum of individual views. The focus groups (3 in total) followed a schedule of key issues to discuss and specific participatory exercises or activities. Appendix II was used to elicit information from I&APs, while Appendix III pertained to

the academic stakeholder group. Venn diagrams, pairwise ranking and social landscape or participatory mapping was used to illustrate responses from these stakeholder groups.

### ***5.5.3 Institutional or venn diagrams***

This method visually illustrates the power and decision-making structures and individuals that the community perceives to be influencing decisions at the local level, especially as they relate to coastal zone management, policy-making and developments in the area. The venn diagrams helped the researcher understand the roles of the local and outside organizations and the perceptions that stakeholders had about them. The relative importance of each structure/ institution and the relationships between each other are represented using circles, the bigger the circle, the greater the perceived influence. Furthermore, overlapping of circles indicates that they overlap in terms of membership and/ or decision-making.

### ***5.5.4 Ranking exercises***

Ranking exercises using pairwise ranking and scoring were conducted. Pairwise ranking and scoring are tools for identifying issues of concern, their causes and prioritizing these problems. The ranking exercises for this study focused on identifying key development drivers in the area and the main problems that are currently being experienced. The discussion included an examination of how different stakeholders ‘see’ their physical environment in relation to key concerns. Each focus group was asked to identify development drivers in the area under study. Using a matrix, each development driver identified was weighted against another. Finally, the drivers were scored and ranked, that is, the driver that received the most scores was ranked 1. Note that if two or more drivers received the same score then they received the same ranking (for example, if two drivers received the same ranking score of 5, the driver ranked after these two would receive a score of 7).

### ***5.5.5 Social landscape/ participatory mapping***

Social landscape mapping can assist to help outsiders/ researchers understand how stakeholders see and interact with the spatial environment. It can also visually illustrate historical, current and future spatial aspects (such as infrastructure development and biodiversity hotspots), and can also assist in building consensus or form a base for resolving conflicts and differences of opinion. Public participation had been considered as a fundamental activity for this research. The focus group sessions were supported by map work designed to support participation of the stakeholders of the study area. The focus group sessions were designed to collect the contributions from the participants with regard to their perceptions concerning the state of the area of study and visions for its future development. The spatial component of this focus group activity involved participants adding spatial information, based on perception, to a base map, which was then compared to the actual rate of change and general trends observed from the time series analysis. In this study the main aspects examined during the participatory mapping exercises were current and future development drivers in the area and identification of biodiversity hotspots/ areas of vulnerability. In the data analysis chapter, the results from the different focus groups mapping exercises were combined since they were similar.

### ***5.5.6 Key Informant Interviews***

Key Informant Interviews are a cost-effective and relatively rapid way of gaining information from a range of stakeholders. The Key Informant Interviews for this study, as illustrated in Table 5.3, were either conducted telephonically, electronically (via e-mail) or face-to-face. The respondents were contacted, and depending on their availability and preference, the appropriate and most convenient protocol was used to interview them. In all instances, however, the same interview schedule (for each target group) was used. The main issues examined during the Key Informant Interviews were:

- Policy and institutional aspects in relation to coastal zone management;
- Land use development (especially key drivers);
- Biodiversity pressures in the area; and
- Tourism

It is important to note that the above aspects served primarily as checklists but were not prescriptive and additional issues were raised by the respondents, if deemed appropriate.

## **5.6 Time series change analysis**

As coastal researchers and managers take a broader, more holistic view of ecological patterns and processes, the need has arisen to obtain spatially referenced information over large coastal regions, and hence remote sensing (RS) and geographic information system (GIS) techniques, which have the ability to collect, structure, and analyze such coastal management relevant spatial information, has become quite popular in management initiatives (Klemas, 2001: 47). For instance, it is easy to measure the amount of overall expansion based on the monitoring of remote sensing imagery, as well as to measure the expansion from a certain period to another one by noting the change in overall acreage of a specific urbanized area (Liu *et al.*, 2005: 450). The intensity of urbanization, indicated by urban land expansion is significantly the most easily identifiable characteristic as the process which affects land cover and use at regional and even global scales (Liu *et al.*, 2005: 450).

The time series analysis was conducted with the primary objective of comparing the results, qualitatively and quantitatively, of different land use and land cover changes that have occurred in the study area, and covered the periods 2000, 2001, 2002, 2003 and 2008. The sensor used was Landsat 5, which was sourced from United States Geological Survey (USGS, 2009) website. Landsat imagery has been found to be suitable for obtaining an overview of the coast or a landscape level (Haag, 2002: 73). SPOT imagery is more suitable for detailed studies in the coastal zone due to their finer resolution, but the drawback in their use stems from the fact that they are too expensive. This study used Landsat 5, with a spatial and temporal resolution of 30 meters and 16 days, respectively. The imagery was sourced at no charge and was found to be highly accessible. The study utilized a supervised classification which yielded 10 land use and cover classes.

The hierarchy of the classification used is illustrated in Table 5.4, and is based primarily on that developed by the land cover/ use classification system for South Africa developed by the Council for Scientific and Industrial Research (CSIR) in 2001 (Appendix I). The description of the littoral zone is based on vegetation and substrate types defined by Mucina *et al.* (2006 cited in Mucina and Rutherford, 2006: 575). Level I are the classes that have been mapped, while level II and III represent categories and descriptions of land use/cover within the level I classes.

Table 5.4 Classification hierarchy (adapted from CSIR, 2001)

Level I	Level II	Level III
Littoral zone	Rocky shores Sandy shores Primary dunes	Mobile sands Rocky outcrops, natural pools, below the high and low-water marks Vegetated part of the beach, youngest pioneer strand community comprising low creeping grasses and succulent herbs
Secondary dune	Back-dunes	Shrub community made up of shorter bushes; ‘clipped-hedge’ canopy of the shrub-thicket community and the forest community
Coastal forest	Coastal forest and Thornveld	Typical Coast-belt Forest, dune and mangrove forest
Wetland	Wetlands	Natural or artificial areas where water level is near land surface on a permanent or temporary basis
Water bodies	River water	Rivers and permanent open water area, including estuaries
Urban agriculture	Market gardens	Small-scale commercial and subsistence farming
Commercial forest	Forest	Small-scale commercial forestry
Commercial sugarcane	Sugar cane	Permanent cultivated land under cane
Sealed surfaces	Residential	Formal, informal residential
	Non-residential	Commercial, office, tourist development and infrastructure
	Transport corridors	Major and minor roads
Grassland	Untransformed	Grass-like, non-woody, herbaceous plants, grassland biome, indigenous species
	Transformed	Planted grassland, golf courses

### ***5.6.1 Classification***

There are essentially two types of classification, namely, supervised and unsupervised (although sometimes a combination of the two is used). Supervised classification, as was used in this study, utilized the statistical properties of ‘training sites’ to identify land cover classes of similar spectral properties (Tanser and Palmer, 2000: 197). To map out the 10 land use classes fieldwork was carried out during May 2009. A Global Positioning System (GPS) was used to collect training samples for each of the respective land use classes identified by stakeholders from the focus group discussions, prior to the maps being generated. In total, there were 500 samples, that is, 50 for each class. Subsequently, a supervised classification was undertaken using a Maximum Likelihood Classifier (ERDAS, 2004). Seventy percent of the samples were used to classify the Landsat 5 imagery, while the remaining 30% served as a test data set. Overall good accuracies (85%) were obtained, with class accuracies varying between 80-90%.

The following steps were included in capturing, analyzing and generating the map products:

- Initial field collection of GPS point data of the different and likely land use/ cover types identified during the Key Informant Interviews and focus group discussions. The fieldwork also included observation of the state of the environment, which was captured by photography;
- The accessing of Landsat 5 imagery from the USGS website, by clipping the appropriate coverage according to the study boundaries. The frequency of change detection was based on obtaining yearly accounts of imagery. The seasonal variation for the available years was found to be inconsistent;
- Pre-processing of Landsat-5 imagery which was acquired on December 2000, 2001, 2002, 2003 and 2008. These images were already geo-referenced (WGS 84, UTM Zone 36 S). Three main pre-processing steps involving geometric and atmospheric radiometric corrections were applied;

- Geometric correction was done using coordinates measured with a Global Positioning System (GPS) as Ground Control Points (GCPs) and first order polynomial was used to register and then re-sample the image using the nearest neighbor algorithm;
- Atmospheric correction was done to remove the atmospheric effect due to absorption and scattering. The correction used ATCOR 2 in Erdas Imagine 8.7; and
- Generating maps in a GIS using ArcGIS 9.1 and quantifying land use/ cover changes in area.

### **5.7 Data Analysis**

The issues emerging from the study are discussed thematically in the context of coastal zone management in relation to the following:

- Socio-economic considerations in the study area;
- Threats to the biodiversity in the area;
- Key drivers of change and points of conflicts;
- Future development pressure points;
- Policy review and critique of institutional arrangements; and
- Tourism issues

Thematic analysis, as indicated by Fereday and Muir-Cochrane (2006: 1) and Kitchin and Tate (2000: 239), require the identification of master or first order themes emanating from the information collected and where appropriate, sub-themes or second order themes can emerge as well. After the themes were extracted, the data were interpreted using the processes of describing the data (portraying the data in a way that is easily understandable), classification of the data (breaking up the data into similar components and placing them into similar groups) and examining the interconnectivity of the data (finding associations and relationships) (Kitchen and Tate, 2002: 235). In terms of the classification and interconnectivity of data, the development of matrices and indicators formed an important component of the analysis that is presented in the next chapter.

## **5.8 Conclusion**

This chapter has looked at the research methodology adopted in this study, outlining the techniques used in obtaining the data required to address the research objectives. Furthermore, background information to the study area under examination was presented. The use of triangulation provided different opportunities to probe and explore the key themes under investigation in a flexible and complementary manner. The variety of approaches adopted also ensured the integration of biophysical and spatial aspects with social, economic and political information, perceptions and experiences. This study offers a useful example of integrating qualitative and quantitative methods to provide an analysis of coastal zone management concerns and issues.

## CHAPTER 6

### Data Analysis and Discussion

#### 6.1 Introduction

This chapter provides a critical analysis and discussion of the primary and secondary data. To this end, certain issues presented in chapter three (literature review) and chapter four (coastal zone management in South Africa) will be elaborated on and integrated into the discussions and analysis. The first part analyzes the primary data gathered in the study, largely drawn from focus group discussions and key informant interviews with developers and coastal managers. The responses from the environmental and tourism stakeholders are discussed in a separate section given the specific perspectives and nature of the questions that they addressed. Where stakeholders were asked to comment on policy, these responses were incorporated in the policy review which is discussed in the second section of this chapter. The policy review uses a combination of secondary data sources and stakeholder perceptions emanating from the focus group discussions to highlight the link or lack thereof between policy and practice. Specifically, the following thematic issues are examined:

- Population in the study area;
- Time series of land use and cover change;
- Threats to the biodiversity in the area;
- Key drivers of change;
- A critique of management tools and strategies for development;
- Conflicts relating to land use and development;
- Tourism;
- Institutional decision-making in the study area; and
- Policy review

The time series of land use and cover changes are also reviewed in this section. The major limitation to this study was the relatively poor response from developers compared to the other stakeholders, and this needs to be highlighted.

The key aspects covered in this chapter include stakeholder perceptions with regard to:

- Providing a description and critical analysis of key environmental (including ecosystems) and socio-economic issues in the study area;
- An identification of key threats and pressures to the ecology in the study area;
- The identification and critical examination of key policies and institutions that influence the management of the coastal environs in the study area; and
- An analysis of key stakeholder interests, roles and concerns.

The end result is an attempt to produce a strategic analysis which describes the framework for the integrated coastal management of the study area which informs the SEA indicators, conclusions and recommendations presented in the final chapter of the thesis.

## **6.2 Population in the study area**

The South African census data (Gebreslasie, 2009) for the eThekweni, eDondakusuka and KwaDukuza municipalities (Table 6.1) indicate a growing population trend within the study area. Parts of the study area are located within these municipalities. The population trends reveal that from 2001 to 2009 (less than a decade) the overall growth rate was 6.51%. Specifically, during this period the population in the eThekweni Municipality grew by 12.65% with the growth rate in KwaDukuza increasing at 4.06% and the lowest at the eDondakusuka Municipality, which indicates a decrease (-2.83%) in population. This is largely a rural, traditional area Municipality and the slow pace of development may be a result of people migrating out of the area in search of jobs and better opportunities. Glavovic and Boonzaier (2007: 5), for example, argue that Gross Geographic Product (GGP) per person differs across racial and geographic lines in South African urban and rural coastal areas, where the rural areas are often neglected, with the

populations lacking access to adequate facilities and employment opportunities. Furthermore, they state that McCarthy *et al.* (1998 cited in Glavovic and Boonzaier, 2007: 5) indicated a higher GGP in the developed coastal towns such as Cape Town, Durban and Port Elizabeth than in impoverished rural areas such as the Eastern Cape and northern KwaZulu-Natal (such as the location of the eDondakusuka Municipality in the study area). The indications are, therefore, that developed towns on the north coast could see an influx of in-migration as investment increases in the area.

While the highest portion of the population is concentrated in the southern portion of the study area (eThekwini), the eThekwini Transport Authority Study predicts that future growth rates will be highest in northern areas of the study area (eThekwini Municipality 2007: 7), one reason for the inclusion of this area in the GIS analysis. There are several reasons for this, and they are largely driven by the growth inertia that is exceedingly moving northward of the City of Durban, especially in relation to the airport and estate developments in the area.

Table 6.1 Population figures for the study area

<i>Municipality</i>	<i>2001</i>	<i>2005</i>	<i>2009</i>	<i>% change from 2001-2009</i>
eThekwini	3 090 121	3 242 456	3 537 505	<b>12.65</b>
eDondakusuka	128 669	135 012	125 125	<b>-2.83</b>
KwaDukuza	158 581	166 399	165 299	<b>4.06</b>
<b>Total</b>	<b>596 262</b>	<b>3 543 867</b>	<b>3827929</b>	<b>6.51</b>

The development of the north coast must be seen in light of the expansion of the City of Durban, which traditionally centered around and expanded due to port-related and industrial activities (primarily the Southern Industrial Basin and also where the current airport is located) and the major developmental projects currently underway and planned in the study area. Major transport axes (the Old Main Road and then the N3 moving east-west and the R102 and N2 moving towards the north and south) have been the catalyst

for the expansion of residential development out of the city. Middle and lower income housing developed to the north and south of the city, whilst higher income residential development grew westwards (INR, 2007: 29). An imbalance developed where a large number of people lived to the north of the city but had to commute to the Southern Industrial Basin for employment increasing daily travel times and costs (INR, 2007: 29).

Since the mid-1990s, high income residential development has moved northwards along the M4 and settled specifically in the coastal towns which were residential but also held a resort component (Jones, 1994: 3). These coastal towns were largely developed on vast tracts of commercial sugar cane tracts. The New Town Center and Gateway complex at Umhlanga, and the office park on the La Lucia Ridge area have also seen significant growth since the late 1990s, thus the City has experienced a shift in growth from the western axis to the northern axis (INR, 2007: 29) which is likely to increase pressure and promote further development in the north coast.

### **6.3 Time series of land use and cover change**

Table 6.2 indicates the land use and cover classes determined by the stakeholders consulted for this study as well as area occupied by the specific land classes in ha, while the maps (Figure 6.1) visually represent the changes that have taken place within these classes between the years 2000 and 2008 (specifically 2000, 2001, 2002, 2003 and 2008 when the data was available for analysis). Most of the land cover classes have shown a steady decline over the eight year period. The most significant declines from 2000 to 2008 were experienced in relation to coastal forests (-40%), wetlands (-37.49%), commercial forests (-33.34%) and secondary dunes (-21.44%). Other classes in decline were grasslands (-19.99%), urban agriculture (-18.18%) and commercial sugarcane (-17.64%). Clearly, agricultural activities (including forestry) and key ecosystems such as coastal grasslands, forests and wetlands are declining. The statistics reveal that the natural resource base has been decreasing significantly over the last decade. The environmental consequences are likely to be dire which reinforces the need for strategic spatial and integrated planning in the area.

The most predictable increase in land use has been the increase in sealed surface, by 80% between the years 2000-2008. This reflects the large-scale development occurring in the area. This aligns with the DAEA (2004: 1868) and INR (2007: 29) perspectives that the north coast area has the fastest growing real estate industry in South Africa with the Ilembe District Municipality being one of the fastest growing, in terms of development applications, in the country. According DAEA (2004: 1869) this growth is expressed most pronouncedly in the linear growth of holiday homes and tourism infrastructure in the area. This is attributed to the accessible beaches which attract a large number of people.

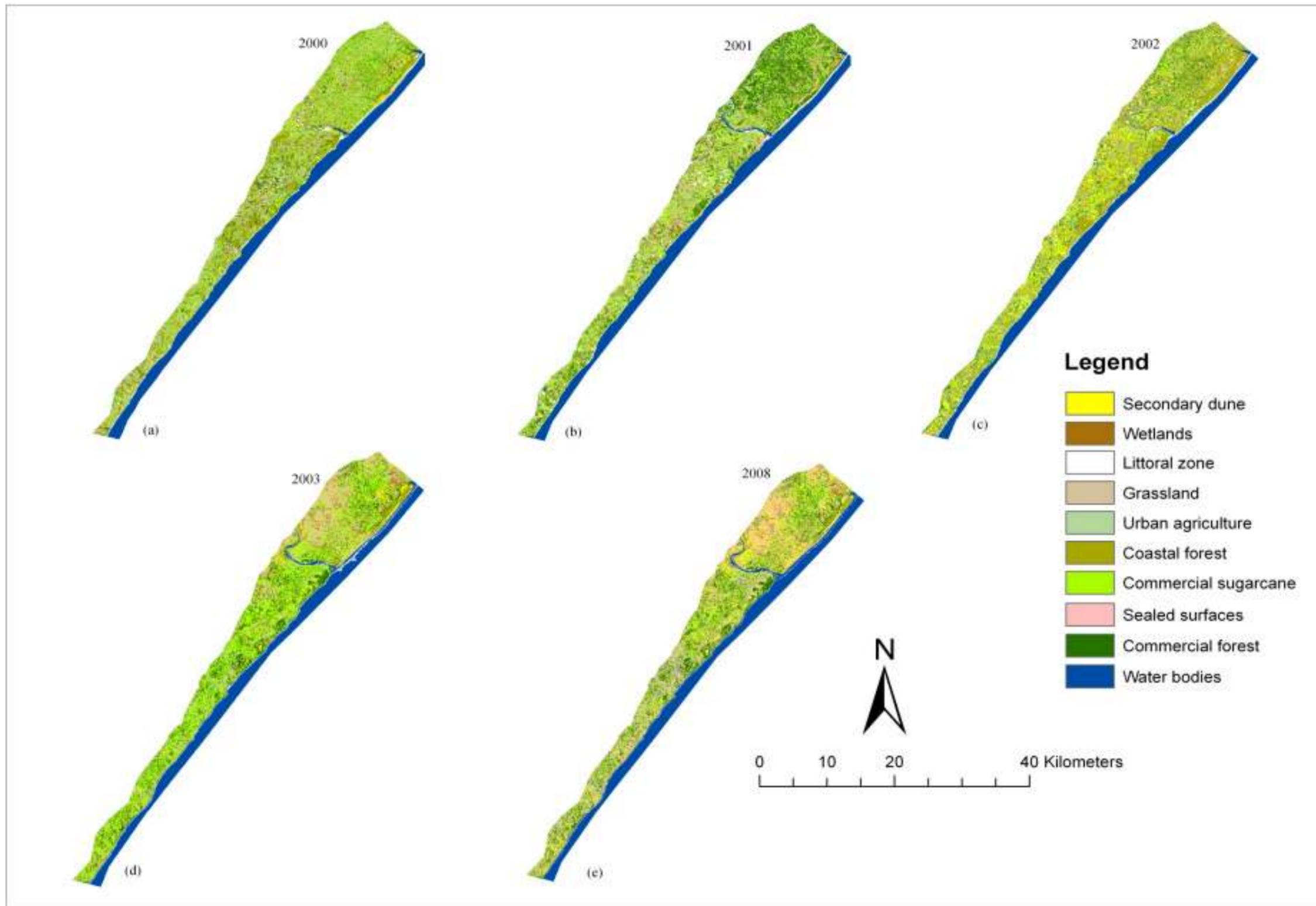


Figure 6.1 Time series of land use and cover change 2000-2008

Other increases were in relation to water bodies (+19.99%) and littoral zones (+11.11%). It is important to note from Table 6.2 and Figure 6.1 that most of the changes are noticeable from 2003 to 2008 which implies that these are recent (and relatively rapid) changes. Of concern is also that a trend is clearly discernible which suggests that the changes are likely to continue in the near future.

Table 6.2 Change in land use and cover classes in ha (2000-2008)

<i>Class</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>2008</i>	<i>*% change from 2000 to 2008</i>
Water bodies	1941 <i>** (5%)</i>	1941 <i>(5%)</i>	1941 <i>(5%)</i>	1941 <i>(5%)</i>	2329 <i>(6%)</i>	19.99
Commercial forest	4658 <i>(15%)</i>	4658 <i>(12%)</i>	3881 <i>(10%)</i>	3881 <i>(10%)</i>	3105 <i>(8%)</i>	-33.34
Wetland	3105 <i>(8%)</i>	3105 <i>(8%)</i>	3105 <i>(8%)</i>	2717 <i>(7%)</i>	1941 <i>(5%)</i>	-37.49
Grassland	1941 <i>(5%)</i>	1941 <i>(5%)</i>	2329 <i>(6%)</i>	2329 <i>(6%)</i>	1553 <i>(4%)</i>	-19.99
Commercial sugarcane	6598 <i>(17%)</i>	6210 <i>(16%)</i>	6598 <i>(17%)</i>	6598 <i>(17%)</i>	5434 <i>(14%)</i>	-17.64
Littoral zone	3105 <i>(8%)</i>	3105 <i>(8%)</i>	3105 <i>(8%)</i>	3105 <i>(8%)</i>	3493 <i>(9%)</i>	11.11
Secondary dune	5434 <i>(14%)</i>	5434 <i>(14%)</i>	5046 <i>(13%)</i>	5046 <i>(13%)</i>	4269 <i>(11%)</i>	-21.44
Sealed surface	1941 <i>(5%)</i>	1941 <i>(5%)</i>	2717 <i>(7%)</i>	4269 <i>(11%)</i>	9703 <i>(25%)</i>	80.00
Coastal forest	5822 <i>(15%)</i>	5822 <i>(15%)</i>	5434 <i>(14%)</i>	5046 <i>(13%)</i>	3493 <i>(9%)</i>	-40.00
Urban Agriculture	4269 <i>(11%)</i>	4658 <i>(12%)</i>	4658 <i>(12%)</i>	3881 <i>(10%)</i>	3493 <i>(9%)</i>	-18.18
<b>Total</b>	<b>38813</b>					

\*Change taking into account present total cover (2008) rather than original coverage (2000)

\*\* Percentage cover of land use/ cover for that year in relation to total area

The discussion below is a more detailed analysis of the land use and land cover changes using a time series analysis approach. Furthermore, the discussion examines the spatial manifestations of the results presented in Table 6.2.

Water bodies, significantly, make up the least class coverage in the study area (a worrisome indication considering the large number of rivers), and this is perhaps the first area of concern despite the overall increase of 19.99% from 2000 to 2008 (Figure 6.2). This low coverage of water bodies concur with previous studies such as Goodman (2005) and Turpie (2004) who indicate that the state of estuaries in the study area is in severe decline. The increase in water bodies may therefore be attributed to landscaping around water features in the growing number of eco-estates in the area (Plate 6.1), and not necessarily from natural open water body surfaces. Wetlands have shown a decline since 2000 and indicate a 37.49% decline between 2002 and 2008. While this may not appear significant, since wetlands only accounted for 8% of the land area in 2000, the cumulative impacts of wetland and wetland function loss is significant. According to SiVEST (2007: 16), floodplain wetlands play an important role in the hydrological functioning of the river as they regulate flood flows by impounding excess water and slowly releasing it into the downstream drainage system once high flows have abated. The retention of water in floodplain areas also traps sediment and removes nutrients and other pollutants (such as suspended solids), thus purifying water from upstream sources (SiVEST, 2007: 16).



Plate 6.1 Water feature in an eco-estate in the study area (DWAF, 2008, 29)

Grasslands showed a 19% decrease from 2000 to 2008. The findings concur with that of several authors who state that South Africa's grassland biome is considered critically endangered (Olsen and Dinerstein, 1998; Reyers *et al.*, 2001 cited in Grey-Ross *et al.*,

2009: 372). This is significant as grasslands made up the least coverage of land use in the area in 2000 (5%). One of the reasons attributed to high transformation could be due to the increases in planted grass in landscaping and golf courses (Plate 6.2). According to Markwick (2000: 515), globally, the creation of golf courses is currently one of the most rapidly expanding types of extensive land development, requiring a substantial amount of land (it is estimated that an 18 hole golf course requires approximately 50-60 ha of land). Furthermore, the most suitable areas for golf course construction avoids steep slopes, wetlands, wooded areas or rock (Markwick, 2002: 515), and typically, grasslands provide the ideal location for golf courses in the study area.



Plate 6.2 Golf course on an eco-estate in the study area (DWAF, 2008: 29)

Coastal forests have shown a decline by 40% between 2001 and 2008. This is significant, because as Figure 6.1 indicates, coastal forests made up the second highest portion (15%) of the total land area in 2000 (the highest portion was made up by commercial sugar cane, which accounted for 17% of the total land area). As highlighted in the methodology section, only a small portion of coastal forests exists, and is limited to the Umhlanga and Ballito areas. Coincidentally, these areas are also sought-after for development activities, typically eco-estates and tourism related activities. Similarly, secondary dune vegetation has also decreased by 21.44% between 2000 and 2008. This can be attributed to the increasing amount of development occurring in forests such as residential and eco-estates, who capitalize on the naturalness of areas as a major component of their establishments. The littoral zone has increased by 11.11% between 2000 and 2008.

There have been significant declines in primary sector production in the study area, most notably in commercial forestry and agriculture. Commercial forests, which have been constantly decreasing, have shown a 33.34% decline between 2000 and 2008. Commercial sugar cane has declined in the area by 17.64% between 2003 (when it remained constant) and 2008. Furthermore, urban agriculture such as market gardening decreased by 18.18% between 2000 and 2008. The loss of primary production in agriculture and forestry has severe implications for primary sector employment and food security in the area, and presents a potential area of conflict in the study area.

The land uses and key types of ecosystems in the area revealed in the maps reflect high levels of multi-functionality that influences the distribution of human and natural environments along the coastal zone.

#### **6.4 Threats to the biodiversity in the area**

While many detailed biodiversity studies have been conducted in the study area, it is not the aim of this study to attempt to provide a detailed account of biodiversity threats at an individual species level. This study looks at broad-scale and overall impacts intended to inform strategic intervention, and has adopted an approach that looks at the patterns and processes which are considered important for the maintenance of functionality of important ecosystems, as well as to provide ecosystem goods and services on which humanity and other organisms depends. The data elicited from Key Informant Interviews (the environmental experts), combined with secondary data attempts to highlight the current state and threats to the key ecosystems in the area (Table 6.3). The participatory mapping of biodiversity ‘hotspots’ in the study area (Figure 6.2), was derived from the input from both the I&AP focus group discussions. Furthermore, important threats (both natural and anthropogenic are considered in order to identify resilient and vulnerable areas from a development perspective, by linking ecological functionality with sustainable socio-economic development.

The practice of intense sugarcane cultivation (although not an indigenous species to the area), is significant, as this landscape has evolved under this constant, intensive, human impact. This has resulted in a highly differentiated mosaic of landscape types, ranking from semi-natural to highly artificial ones and thus has limited and highly fragmented biodiversity. According to Mucina *et al.* (cited in Mucina and Rutherford, 2006: 16), the concept ‘mosaic’ refers to a situation where patches of respective vegetation units become ‘dissolved’ into neighboring vegetation units. For example, derelict cane sites, if left alone, will succeed to forest and/or alien vegetation, with little habitat diversity and functionality. According to Reyers *et al.* (2007 cited in de Villiers *et al.*, 2008: 4), a vegetation type will move towards a higher category of threat as it is reduced in extent, and ecosystem functioning is disrupted. Furthermore, the authors assert that this approach to assessing cumulative impacts would be particularly useful in sectors such as agriculture where ecosystems are subject to large-scale but incremental transformation (Reyers *et al.*, 2007 cited in de Villiers *et al.*, 2008: 4), as is the case in the area under study. In the study area, key informants also indicated that a further limiting factor yielding low biodiversity is the intensive use of chemicals and fertilizers in the management of commercial sugar cane. This is likely to have environmental and human health consequences in the area.

#### ***6.4.1 State of key ecosystems***

As mentioned previously, broad categories of ecosystems were included in the analysis. Where two or more states are indicated, this accounts for the different types of systems that occur on the ground, for example, there are different types of coastal forests that occur in the study area. Furthermore, they reflect the divergence in different stakeholder perceptions of status. The overall trend suggests that all ecosystems in the study area are under significant stress. Table 6.3 summarizes the perceived status of the ecosystems in the area under examination emanating from the Key Informant Interviews (environmental experts).

Table 6.3 Status of key ecosystems

	Threatened			Not threatened	Least concern	Pattern/ process impacted upon
	Critically endangered	Endangered	Vulnerable			
Coastal forests	<b>P</b>	<b>P</b>	<b>X</b>	--	--	Affects plant salinity tolerance levels Biodiversity refuge Coverage and habitat type for dependent species
Estuary		<b>P</b>	<b>X</b>	--	--	River flow Productivity Biodiversity refuge
Wetland			<b>X</b>	--	--	Alteration of hydrological functions Impacts on biodiversity refuge
Grassland	<b>P</b>	<b>P</b>		--	--	Impacts on biodiversity refuge Absorption-run off imbalances
Dune cordon			<b>X</b>	<b>P</b>	<b>P</b>	Sediment loss Compaction

X: All respondents in the biodiversity expert stakeholder group

P: proportion of responses (unquantified) in environmental stakeholder group

Table 6.3 shows that all ecosystems were regarded as being threatened to some extent by all or some of the respondents. The most threatened ecosystems were deemed to be grassland, coastal forest and estuaries. This is in keeping with the literature which shows that these ecosystems are the most fragile in coastal environments and are under significant pressure (Goodman, 2005; Kuyler, 2006; Rouget *et al.*, 2004; Turpie, 2004). Furthermore, their uniqueness makes them significantly more difficult to rehabilitate and therefore proper management and protection of these ecosystems become of paramount importance. Specifically, while all the respondents felt that coastal forests were vulnerable, some of the respondents also indicated that the coastal forests were endangered or critically endangered. All respondents stated that the estuaries were vulnerable while a few respondents felt that they were endangered. All respondents stated that wetlands in the area were vulnerable. In relation to grasslands, respondents stated that they were either critically endangered or endangered. This is significant as all

respondents concur that grasslands are threatened ecosystems. Respondents claim the rapid decline in grasslands is due to the perception from developers that these sites are disturbed due to agricultural practices (sugarcane cultivation), and hence available to develop. Many respondents stated that grasslands are also the most poorly appreciated and understood ecosystems.

In relation to the dune cordons, the responses were mixed in that some respondents felt that they were vulnerable while some stated that they were not threatened or of least concern. The rating of the status of dune cordons may in part be attributed to some of the respondents not having a clear understanding of these ecosystems and more importantly, the ecosystem functions they provide. This was evident during some of the Key Informant Interviews. Vulnerability (where stated) was attributed to the shrinking coastal belt, due to uncontrolled building expansion which was seen as reducing the dune cordon and thus impacting on endemic species that they can harbor. One such dune species is the Crested Guinea fowl (*Guttera pucherani*) which is a dune bird species. According to some respondents, this species is of concern and is considered threatened. Furthermore, there was found to be a strong correlation between vulnerability status of dunes and location (that is in the southern portion of the study area, which is regarded by respondents as highly transformed). On the contrary, the dune cordon in the north of the study area, was seen as of least concern (or in a fairly adequate state) due to the lack of intense development, however, respondents suggested that conservation effort is needed to maintain these dunes as development inertia indicates a northern direction, and the impacts of southern dunes could be replicated in the north.

In term of the impacts, the loss and/or degradation of coastal forests were deemed to affect plant salinity tolerance levels, reduce biodiversity refuge areas and diminish coverage and habitat types for dependent species. The decline in estuaries was viewed as impacting on river flows, productivity and reducing biodiversity refuge areas. The respondents felt that the reduction or degradation of wetlands would result in the alteration of hydrological functions and reduction in biodiversity refuge areas. In relation to grassland decline, the main impacts were identified as reducing biodiversity refuge

areas and creating absorption-run off imbalances. The impacts on dune cordons were in relation to sediment loss and compaction.

The threatened (especially the critically endangered and endangered) ecosystems were also identified as biodiversity hotspots during the participatory mapping exercises. Furthermore, the results presented here in relation to stakeholder perceptions reinforce the findings from the mapping exercises presented in Figure 6.1 which indicates that the key coastal ecosystems are on a decline and under serious threats with the decrease being over 20% in less than a decade in some cases.

Coastal forest and grasslands are important biodiversity refuge for a number animal species, which rely on combinations of habitats for their ecological requirements. Respondents claim that there is significant transformation (mainly to alien vegetation) and habitat fragmentation in the study area. Where coastal indigenous forest is concerned, respondents claim that only small portions exist in patches along the coastline. They report these occurring near rivers, and specifically in the study area, they occur near Ballito and south of the Tongati River and the Hawaan forest in Umhlanga, thereby concurring with the assessment made by Mucina *et al.* (2006 cited in Mucina and Rutherford, 2006: 578). Respondents also concur that grasslands are under severe threat from transformation. They claim that development in general is not considering the biodiversity links between different habitats when they develop and/or fence off property. Furthermore, sugar cane has acted as a buffer from development for years, and this needs to be maintained.

The results show that some of the most significant impacts of development on these ecosystems identified by the respondents were the reduction in their area and fragmentation. According to Sole *et al.* (2004: 56), fragmentation occurs when native vegetation is cleared (for agriculture or other kinds of intensive exploitation) and habitats which were once continuous become divided into separate fragments, which tend to be very small islands isolated from each other by crop land or built environments. Fragmentation and loss of habitat are recognized as the greatest existing threat to

biodiversity (Sole *et al.*, 2004: 65). Respondents argue that in the study area most of the natural vegetation has been cleared for cultivation of sugarcane or development. Plant species are thus impacted upon where there are no linkages or corridors between the patches where they occur. Consequently, pollinators and distributors of seed (insects and birds) do not venture out of these patches, resulting in a decline in the gene pool, thus making plant species within that gene pool more vulnerable to natural and anthropogenic changes.

As fragmentation increases, the impacts are a reduction in the indigenous species and an increase in alien species. According to key informants, *Chromolaena odorata* and *Lantana camara* are the most common types of invasive alien species. These invasive species are a major threat to the ecosystems in the area, perhaps as significant as developmental pressures. This concurs with the findings of Mucina *et al.* (2006 cited in Mucina and Rutherford, 2006: 575) who identified alien plant invasions as one of the key threats to natural land cover in the area (adjunct with cultivation and afforestation, and urban and industrial expansion).

The greatest impacts on wetlands and estuaries are due to catchment and up-stream activities such as land conversions, damming of sediment, sediment extraction from estuaries (for example controlled and on a larger scale, uncontrolled sand mining) and the location of sewer treatment works on some of the major estuaries. All these have various impacts on siltation and erosion, loss of flood plain as well as pollution that compromise their biological productivity. Furthermore, infrastructure such as roads and bridges alter river flows and hydrological characteristics of these systems. The citing of sewer treatment works on some of the major rivers in the study area is of concern. Due to system overloading, release of untreated sewer into rivers and poor maintenance of infrastructure, sewer pollution is a significant problem which has implications for estuaries as breeding grounds for juvenile fish species, harvesting of species and tourism. Furthermore, treatment works increase river flows, resulting in too much water in estuaries. DWAF (cited by the focus group respondents) has attributed more frequent (than is the norm) estuary breaching to this occurrence. This has impacted on the

estuary's ecological integrity by suddenly lowering the water levels, thus impacting on the plant and animal life in the estuaries.

One of the most significant wetlands systems occurs in the DTP area and is proclaimed to be home to the highest concentration of endangered species in the study area, such as the Pickersgill's Reed Frog (*Hyperolius pickersgilli*). Furthermore, the current wetland system in the DTP area forms part of the route for approximately two million migratory Barn swallows, which is reputed to have a high benefit to ecotourism in the study area (Plate 6.3). In addition these wetlands are significant in South Africa's commitment to the Ramsar convention, which sets out the principles and guidance for wetland conservation and their wise use.



Plate 6.3 Wetlands as refuge for swallows in the vicinity of the DTP area at Mt Moreland

According to Begg (1984b cited in Jones, 1994: 6), the estuarine environment is a particularly important component of the coastal ecosystem and their correct functioning are an asset to the region and are essential to the ecological stability of the whole coastal system. Respondents concur by highlighting the important link between river systems and the near-shore marine environment. They assert that sand extraction from rivers, high run off and removal of sand from beaches and dunes (as is the case in some areas) could seriously affect the supply of sand to beaches as rivers act as sources of sand to replenish

beaches. Furthermore, they assert the seriousness of the situation by indicating that the reduction in sediment supply to beaches could become a regional problem. Beach loss, in turn, affects residential (property owners) and tourism which is heavily dependent on beach tourism. The study area also has important reef and rocky shore biodiversity which need to be considered in terms of pollution and sedimentation from land-based sources.

Respondents indicated an intricate balance in salinity tolerance in vegetation on the coast, where the removal of frontal vegetation impacts on the vegetation behind it, causing die-backs. Furthermore, removal of dune vegetation is responsible for blow-outs and unconsolidated material that is easily removed by wind, and hence compromises the sediment source for beach maintenance.

#### ***6.4.2. Recommendations for biodiversity protection***

Figure 6.2 presents a participatory map of some of the recommendations made by the I&AP focus group stakeholders regarding the areas that require biodiversity protection.

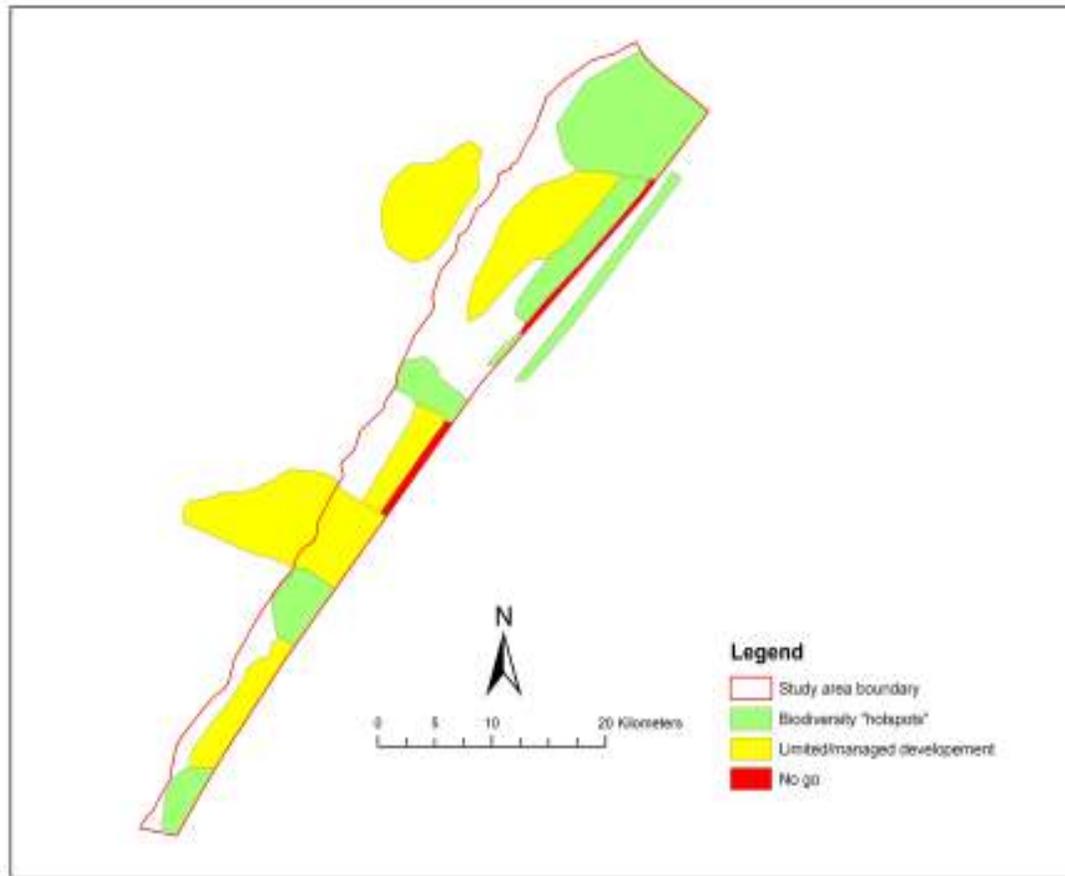


Figure 6.2 Participatory mapping of biodiversity ‘hotspots’ and resilient areas

Respondents suggested that there are clearly some areas that should not be developed, such as the dune cordon, which must be maintained and protected, perhaps by a green wedge between the dune system and development. Furthermore, they assert that it is also important to consider and limit the type of development that occurs, and green areas are required and should be encouraged in the area. The following practical recommendations were made:

- There is a need to consider the options of the northern migration of sand which replenish the beaches (a land-based issue) and there needs to be a green wedge/corridor between development and the coastline. Furthermore, there should be no construction and development in the high water mark. Respondents suggested that management should target landowners, since many beachfront properties are held

- in private ownership. In addition there is a need for managed change on the coastline, especially where development already occurs;
- Ecological corridors, both terrestrial and aquatic for migratory species, should be included in development plans. These were suggested along river corridors; Furthermore, stakeholders suggest the pricing of biodiversity, so the full economic value is appreciated by decision-makers. Furthermore, they stress adopting systematic conservation planning (SCP) for terrestrial and estuarine areas (these are currently being drafted by Ezemvelo KZN Wildlife), which is guided by two objectives: achieving conservation targets that ensure representation of a full variety of biodiversity pattern, and promoting its persistence by maintaining ecological and evolutionary processes and excluding threats (Cowling *et al.*, 2003; Margules and Pressey, 2000 cited in de Villiers *et al.*, 2008: 2);
  - Flow management needs to be monitored and must provide water flows needed to sustain river and estuarine ecosystems in co-existence with land use;
  - Natural habitats have important wildlife benefits and recreational value for people. For example, the coastline between the Ohlangua and Tongati estuary contains rare coastal vegetation and many community members would like to see it retained for a biodiversity park which would encourage ecotourism, for which the area is renowned;
  - The better and wiser use of waste material, specifically the management of sewer systems is needed. According to Treweek *et al.* (1998: 155), when regulating pollution, it is necessary to consider the extent to which the receiving environment is already polluted in determining its capacity for absorbing an additional pollution load; and
  - Alien plant eradication (also on private properties) is particularly important given its pervasiveness in the area.

Figure 6.2 illustrates that the most expansive biodiversity hotspots (indicated in green) in the area was in the northern most part of the north coast. However, this is the area that the time series analysis reveals has had the most significant increases in sealed surfaces in the

study area due to land clearing and development activities. Furthermore, a significant proportion of the area (demarcated in yellow) was identified by the focus groups participants as requiring limited or managed development. Again, major parts of these areas have massive development projects either underway or planned. The results show that an impasse is likely if stakeholders together with developers and decision-making who permit development do not engage with each other to develop viable plans for the area that give due consideration to environmental, economic and social aspects. As will be highlight in the next (concluding) chapter, the combination of a SEA and ICZM plan is best suited to address the concerns raised.

It is important to note than only the littoral (beach zone) was identified as no go areas (indicated in red), that is, areas in which no form of development or disturbance should be permitted. This is in keeping with the literature that highlights the fragility of these ecosystems and the importance of maintaining these areas in a pristine state (Burak *et al.*, 2004; Tzatzanis *et al.*, 2003). Figure 6.2 shows that almost the entire coastline in the northern part (the area also identified mainly as biodiversity hotspots) was identified by the respondents as no go zones. The time series analysis shows that the extent of the littoral zone has increased from 2000 by 11.11%. It is hoped that this increase is indicative of the health status of the beach areas and does not merely reflect high levels of erosion along the beaches associated with the massive flooding that had taken place in 2007. The increase may also be attributed to the development of eco-estates along the coast which often maintain the natural integrity of the beaches as a key marketing component. Additionally, it is worth noting that the ban in off-road vehicle (ORVs) usage along the coast may have also contributed to an increase in the littoral zone. Also, the decline of the dune forest along the shoreline may have led to the increase in the littoral zone.

## **6.5 Key drivers of change**

This section incorporates responses from the focus group discussions for I&APs with regard to the perceived drivers of change. Ranking matrices (Tables 6.4 and 6.5) indicate

the drivers and their relative importance in impacting on the development in the study area. Since the key informants (from the developer, environmental and coastal manager categories) were also asked to respond to this question, their responses are incorporated into the discussion, and appropriately highlighted. Figure 6.3 presents the results from a mapping exercise (derived from responses from the I&AP focus groups) regarding the spatial consideration of key drivers of change in the study area. The ranking exercises for both focus groups were almost similar with development in relation to the trade port, tourism and housing developments being perceived as the main drivers. Eco-estates and the DTP emerged as the biggest direct drivers of change.

Table 6.4 Ranking Matrix - Key drivers of land use change (focus group 1)

Drivers	2010	B&B	R	EE	A	H	GLSD
2010		2010	2010	EE	A	H	GLSD
B&B			R	EE	A	H	GLSD
R				EE	R	R	R
EE					EE	EE	GLSD
A						A	A
H							H
GLSD							

	SCORING	RANKING
2010 FIFA World Cup (2010)	2	6
Bed and Breakfast establishments (B&B)	0	7
Roads both new and upgrades (R)	4	2
Eco-estates (EE)	5	1
Airport and associated Dube Trade Port (A)	4	2
Housing developments (H)	3	4
General large-scale development (GLSD)	3	4

Table 6.5 Ranking Matrix - Key drivers of land use change (focus group 2)

Drivers	2010	PJ	I	CL	A	H	T
2010		PJ	I	CL	A	H	T
PJ			PJ	CL	A	PJ	T
I				I	A	I	I
CL					A	H	T
A						A	A
H							T
T							

	SCORING	RANKING
2010 FIFA World Cup (2010)	0	6
Proximity to jobs (PJ)	3	4
Infrastructure (I)	4	2
Coastal location (CL)	2	5
Airport and associated DTP (A)	6	1
Housing developments (H)	2	5
Tourism (T)	4	2

According to Petschel-Held (2006: 143), drivers of ecosystem change often interact with one another in synergistic ways, for example, they can either trigger each other, or reinforce each other, or they can constrain each other. While the 2010 FIFA (Federation Internationale de Football) World Cup received extremely low priority as a direct driver which triggers land use change in the study area, it is seen as the indirect driver of both tourism and general investment in the area, and especially the development of the DTP and airport. Respondents commented on the long-term viability of the 2010 driven investments by arguing that “it is an attempt to show the best face of South Africa and lots of business linked to infrastructural and building development is generated because of 2010, but a key issue is the long-term sustainability of these development projects as

no other major event is planned for after 2010”. Furthermore, “2010 is just a smokescreen for encouraging foreign investor confidence in the area”.

Eco-estates have been major players of land use change on this coastline for a number of years and are still dominating the land use scene. Some of the most prominent eco-estates occurring in the area are: the Zimbali Lakes and Golf Estate development on the Tongati River, Simbithi Eco-Estate, Seaward Estate, Dunkirk Estate, Nkwazi Ridge Estate, Blythedale Coastal Resort, Brettonwood and Zululami Estates Beverley Hills Estate Extension and Blythedale Coastal Resort (SiVEST, 2007: 39). The biggest concern that respondents expressed about eco-estates was their large cumulative impacts on natural areas, suggesting that the extension of eco-estates constrains conservation of green areas. According to Petschel-Held (2006: 143), the case when one driver constrains the action of another might serve as a starting point for appropriate interventions. There are many more huge developments of this kind planned for the area and the availability of land in the north is a major driver of many of the green-fields projects in this area (Figure 6.3).

Housing, roads and infrastructure appear to be important drivers of change, and will remain so long after 2010. Some of the respondents, especially government officials, generally felt this was a good feature for the north coast. They stated that general large-scale development such as office parks and industrial areas and the Sibaya Precinct act as catalysts for people wanting to live in this area, so they are in close proximity to jobs, suggesting that office parks and housing reinforce each other. However, other key informants (especially those from the environmental sector) raised concerns regarding the magnitude of this development. They stated that the impacts are likely to be worse than eco-estate developments that often have the available resources to manage and even sustain ecological systems. It is important to note that some of the drivers of change actually occur beyond the boundaries of the study area (such as road upgrades, the KSIA and informal settlements), further reinforcing the need to adopt a strategic view of the area. Of particular concern was the proliferation of informal settlements in the area which although not picked up as a major land use in the GIS mapping exercise, is a worrying trend in the area associated with the dramatic increase in development. Informal

settlements are particularly reliant on the natural resource base to meet basic needs. If unmanaged, these settlements will have a devastating impact on the biodiversity in the area which is already under stress.

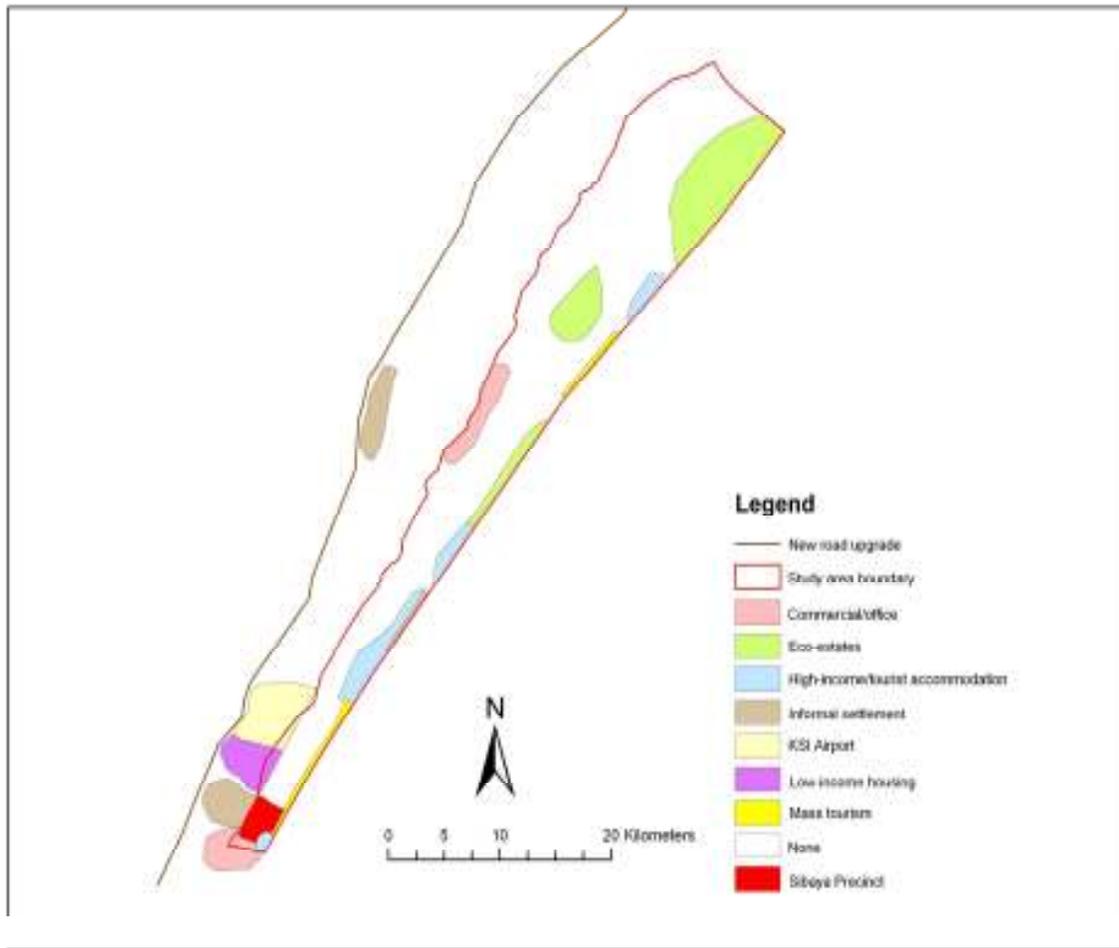


Figure 6.3 Participatory map of key drivers of land use and cover change

The participatory map of the north coast and adjacent areas in relation to identifying key drivers of land use change reinforces the findings emanating from the ranking exercises. Again, the key drivers visually represented in Figure 6.3 are mainly commercial/ office development (along the N2 freeway and close to the airport/ Dube Trade Port), Sibaya Casino expansions (in the eastern part) and KSIA in the eastern part (under completion). Tourism related developmental sites were also identified as key drivers and these include

high income tourist accommodation and mass tourism development (both along the coast). This, tourism development is again highlighted as a key driver in the littoral zone and the dune as well as coastal forest areas. Other drivers were linked to housing developments, mainly massive eco-estate development along the coast and to the north of the study area as well as low cost housing and informal settlements in the east where the airport and DTP development are located.

The participatory map of future investments in the area (Figure 6.4) closely aligns with the map of the key drivers (Figure 6.3). Specifically, eco-estates in the northern part are identified together with large-scale development. Again, high income tourism is identified in the coastal areas. Commercial/ office/ industrial development is identified along the N2 freeway and as per the respondents' perceptions, expected to expand. Low-income housing development is anticipated along the eastern part together with increased airport development.

### ***6.5.1 Future development pressure points***

According to Conway (2005: 877), theoretical explanations of land use conversion variables representing biophysical, socio-economic and spatial policy factors are often included in the factors identifying sites most likely to convert to a given land use. This holds true in determining likely future development trends in the study area. Respondents identified the following factors (Figure 6.4) likely to influence the location of future development: firstly, they identified access to the coast, employment opportunities and transport routes as being important concepts around which growth will be generated in the future. The idea about nodes and corridors stimulating investment and growth is largely driven by the spatial policies such as the Provincial Economic Development Strategy, Municipality level spatial development plans, Local Economic Development (LED) plans (office parks, commercial development) and precinct plans (most notably the Sibaya Precinct in the study area). Developers and management in general, consider the infrastructure to be well provided for in the area, making it highly accessible. Stakeholders from this category, maintain that development trends which are expanding

northward are a positive step as it is seen to bring places of employment and residence closer, and reduces both travel time and cost. Furthermore, the availability of undeveloped land in the northern part of the study area is seen as an opportunity to capitalize on opportunities to further redress spatial and social inequalities.

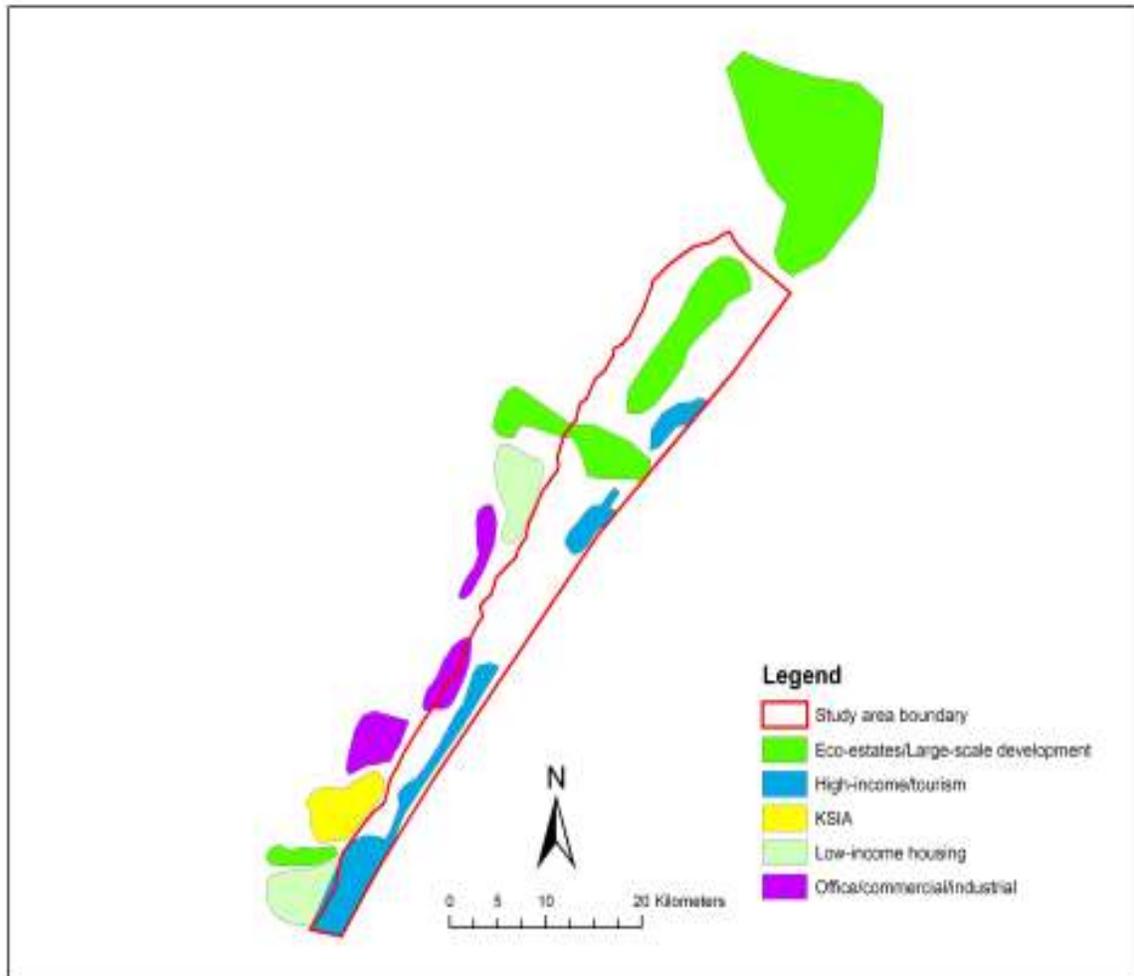


Figure 6.4 Participatory map of future investment areas

All respondents argued that the KSIA and DTP will undeniably have a huge impact on influencing development patterns. Various studies indicate that urban land use change tends to focus on accessibility to existing urban employment center(s) as a key determinant of the location of conversions (Berry *et al*, 1996; Bockstael, 1996; Schneider

and Pontius, 2001 cited in Conway, 2005: 877). As indicated earlier, the related impacts linked to the proliferation of informal settlements already noticeable in the area and identified as a concern by the key informants need to be carefully considered in future planning efforts. Additionally, social factors such as low-income housing developments, for example, the housing development between Phoenix, Verulam, Mt Edgecombe is planned for 72 000 people also needs to be included. Furthermore, developers indicated the growing potential for second home ownership which is stimulated by tourism and growing personal incomes. According to Seymour *et al.* (2009: 7), KwaZulu-Natal performs second to Gauteng with regard to rising personal incomes in 2007. They state that their reasons for choosing to develop on this particular portion of the coastline were due to the proximity to jobs, services such as schools and hospitals, and a large market segment for homes in the area. The results point overwhelmingly to an increase in both low-and-high-income housing in the future of the area.

Economic reasons spurred by the eco-estates are one of the important current and future pressure points where the target segment of these developments is the upper-income earners. These developments are marketed as ‘gated estates’, ‘eco-estates’ and ‘golf estates’ and attract both upper-income residents and tourists. Many of these eco-estates are occurring in a linear fashion along the coastline. This is due to large tracts of agricultural lands that are held in private ownership, some of whom own land up to the high water mark. Furthermore, developers indicated they were involved in a mixture of types and densities of development, ranging from eco-estates as well as general and special residential, tourist and commercial developments, indicating that they cater for a very broad market segment. According to the Barnegat Bay Estuary Program (2001a cited in Conway, 2005: 889), in his studies on growth along the New Jersey coast, tourism, which was spurred by improvements in infrastructure, stimulated near-shore patterns of development, with most buildings located immediately landward of the shoreline. In addition, he found a high correlation between the large percentage of second home ownership and waterfront municipalities (including protected and open space), indicating that water and protected open space are desirable neighborhood amenities (Conway, 2005: 889). Developers indicated that while not all of their development

activities are dependent on a coastal location, the tourist-focused activities are crucially dependent on a coastal location, especially with regard to beach access and sea views.

Another key aspect influencing land use change is property values, which will determine not only the increase in home ownership in the area, but will also influence its location. High-to-middle-income residential, tourism and business is likely to be attracted to the immediate coastal strip (east of the N2), while low-income housing will be a feature in the inland coastal areas (west of the N2). It should be noted that property price factors have historically followed these patterns in South Africa. Conway (2005: 879) states that although land price, population density and available services are considered important socio-economic factors in determining the location of urban development, accessibility to urban or employment centers is a common focus of predictive land use-change models (Conway, 2005: 879).

### ***6.5.2 Socio-economic and environmental impacts of general development***

Various socio-economic impacts were perceived by the respondents. First and foremost, respondents cited job creation as the key socio-economic benefit to the area in general. As the overall standards of living in the middle-income sector in South Africa are growing, more and more people are attracted to the area due to the obvious benefits brought about by the increase in development in the area. Furthermore, development increases the local rates base. Although not available for the eThekweni IDP, the KwaDukuza Municipality sources the biggest share of its funding from property rates (R231 005 510 for the 2007/8-2009/10 period) (KwaDukuza Municipality, 2007).

Concerns regarding environmental issues relate to natural ecosystems and their services being replaced with built services, the loss of ecological services and local climate change impacts. Furthermore, the increase in sealed surfaces impacts on infiltration, runoff and siltation and hence, drainage in the entire study area. According to Wackernagel *et al.* (1999a cited in Gossling *et al.*, 2002: 201), built-up land differs from the other

categories because it does not represent biomass that can be used, but rather “destroyed biological capacity”.

Some developers highlighted that many developments were too close to the sea and properties and services were washed away in the March 2007 floods. Furthermore, there was, in the past, no strategic plan (SEA) to assess development against. KwaDukuza Municipality now has produced an SEA, however, it is too soon to test its effectiveness and is located at a municipal level rather than a coastal zone level. Furthermore, infrastructure such as sewer and water were not able to keep pace with development and it is likely that these problems will worsen in the future given the increase in population and development in the area.

Most of the concerns relate to the demands on services and bulk infrastructure that the new developments are expected to bring. The provincial priority issues also focus on water supply concerns (damming versus desalinization), land pollution and waste management. Respondents are acutely aware of the water and electricity supply stresses in the country. Sewage and its disposal was another area of concern and that treatment plants may have reached their capacity, however, municipalities need to find alternatives to building more treatment plants. A high-tech sewer plant might be a fixable problem. Growth is also expected to place demands on landfills, and respondents indicated a general lack of knowledge, on the part of Municipalities, as to where to appropriately locate disposal sites and how to manage them effectively in ecologically vulnerable areas.

Of major concern was the location of the KSIA and the Sibaya Precinct beyond the demarcated ‘urban edge’ as defined in the eThekweni SDF and respondents were concerned as to how the Municipality was going to provide for the infrastructure as well as the costs to the people of the Municipality. An ‘urban edge’ or ‘Urban Growth Boundary’ (UGB) which defines the area which a Municipality has identified as the outer limit for efficient servicing, is essentially a politically determined line beyond which development is prohibited (Gerber and Phillips, 2004: 1). Policy-makers across the United States have found that many of the cities that have growth boundaries tend to be

rural or sub-urban and located in the areas of the State rich in agricultural land (Gerber and Phillips, 2004: 1). Furthermore, the authors argue that city managers are increasingly turning to UGBs as a means of planning for and managing future residential and commercial development by maintaining a relatively high density of residential and commercial development inside the boundary and a rural density outside the boundary thereby curbing sub-urban sprawl and preserving productive agricultural land and open space on the outskirts of urbanized areas Gerber and Phillips, 2004: 1). Additionally, they argue that these boundaries lower the cost of new growth for municipalities by encouraging compact development and increased densities within the boundary, thereby reducing the costs of infrastructure and service provision per unit of new development (Gerber and Phillips, 2004: 2). The converse is true of the study area. For example, although respondents claim that the study area is split into three major components; rural, peri-urban and urban, and contains large tracts of commercial sugar cane (which concurs with international trends) the converse is true of the management response in this study area.

According to the 2002 SDF of the eThekweni Municipality, the urban edge was formally based on the extent to which the City could supply a waterborne sewerage system and other bulk infrastructure (water, electricity, roads) without capacity constraints (INR, 2007: 80). Whilst the KSIA and DTP site falls outside the urban edge as defined in the eThekweni SDF, Program 9 of Plan 2 in the 2006 -2011 IDP notes that: “The development of the KSIA and DTP is the most important economic project for the region and is projected to provide between 150 000 to 240 000 direct and indirect job opportunities for the KwaZulu-Natal Province” (eThekweni IDP 2006-2011 cited in INR, 2007: 80) It further notes that a key task for the City of Durban will be the identification of phased bulk infrastructure requirements, thus the IDP acknowledges that the Urban Edge as currently defined will ultimately move in accordance with the identification and implementation of the phased bulk infrastructure requirements in accordance with Program 9, Plan 2 (INR, 2007: 80). This development therefore contradicts the eThekweni Municipality’s consolidation of services, densification and 'urban sprawl' policies, which state that: “Using the Municipal Spatial Development Framework (SDF),

the Municipality is committed to the zoning of land in order to increase densities and reduce urban sprawl. The SDF will ensure that there is more effective use of facilities, there is a reduction in the need to build new facilities, and that people live closer to amenities and work opportunities” (eThekweni Municipality, 2007: 7-9).

As already concluded, the development of the DTP and airport will attract new housing, industrial and commercial development to the study area. This will impact on the demand for service provision in the area in terms of electricity and water. Developers feel strongly that water and electricity will have serious implications for their activities. With respect to electricity, an EIA has been approved for the provision of a new sub-station on the DTP site to service the development on site.

With regard to water, respondents indicated the need to assess not only the end-user, but also the source of water in the area (‘needs’ versus ‘availability’). According to a study conducted on the modeling of planning scenarios, water requirements and return flows (DWAF, 2008: 5), the model results indicated that the rate of water demand grew faster than the population and also showed that there is an increase in the rate of consumption as people progress up the water ladder. The Department of Water Affairs and Forestry (DWAF, 2008: 14) indicates that demand for water supply areas will be expected primarily in the coastal areas of KwaZulu-Natal (Figure 6.5). In the study area, the biggest driver of water demand is coming from upgraded service levels and new low income housing, rather than the existing development and this raises questions about equity issues since there may not be enough water for everyone. Furthermore, respondents highlighted that tourist developments, such as hotels and bed and breakfast establishments (B&Bs), are not enforcing water restrictions. Respondents claim that dam capacities are low, and that many of the dams are experiencing pollution and sediment problems. Furthermore, on the water management side, respondents indicated that “the people in charge are not indicating to the public that the reasons for the lack of water in the area (or even acknowledging the problem exists)”. Additionally, the public is not well informed about the “potable standards and quality of the water”. Respondents indicated a general lack of skills in the management of the water sector in the area.

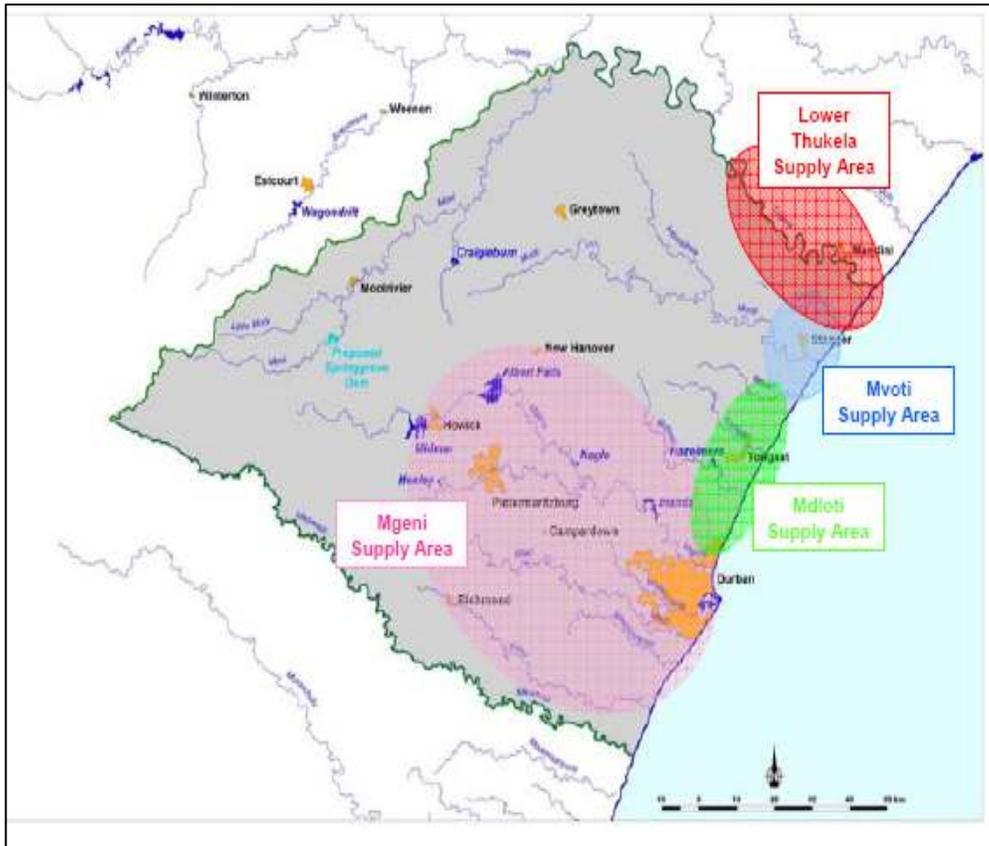


Figure 6.5 Water supply areas in KwaZulu-Natal coastal region (DWAf, 2008: 14)

As a solution, one respondent echoes the claims of others that “KwaZulu-Natal has already run out of water if you assume that only dams provide water”. The key informants propose that solutions can be found in water harvesting (from roof tops) and implementing desalinization as a solution for general large-scale development. However, the biggest stumbling block is the lack of political buy-in to the concepts of harvesting and desalinization (a point which will be discussed further under areas of conflicts in the study area. Developers appear to agree on the inclusion of eco-friendly technologies such as rainwater harvesting and solar power. Two of the developer respondents include water harvesting technologies in their development projects.

## 6.6 A critique of management tools and strategies for development

Respondents from focus groups (1 and 2) and coastal management key informants highlighted that the IDPs and their associated SDFs in conjunction with LUMS are largely responsible for managing and guiding development and investment in the study area. Spatial Development Plans (SDPs), Precinct Plans, Local Area Plan (LAPs) are also put in place to guide development. Coastal Management Plans (CMPs) are intended at Precinct Plan level for all Coastal Management Units (CMUs). Management plans are also intended for each estuary. The intention of these is to provide a strategic management of CMUs, however, these are relatively new or currently being developed.

The EIA regulations and their associated EMFs, as well as the DFA were largely responsible for decision-making regarding individual projects. Furthermore, all activities within a Municipality have to conform to the by-laws of the Municipality. However, both groups of respondents claim that development planning is currently *ad hoc*, with no spatial development directive and/or targets. For instance the EIA and DFA have no facility for accounting for cumulative impacts. Furthermore, the LUMS do not consider coastal opportunities and coastal sensitivities, the pricing of biodiversity targets or development densities. All these determine thresholds and frameworks within which strategic management can align with the mainstreaming of projects. Respondents highlighted the urgent need to address this.

While some respondents felt that these current tools are not strategic, others felt that they do provide and cover for moving towards strategic development, but their weakness stems from poor (to non-existent) compliance and enforcement. Furthermore, they argue that government is starting to recognize the view of the general public and laws are becoming more specific and targeted. However, capacity needs to be built in compliance and enforcement.

With regard to by-laws, respondents stated that with many local authorities under the jurisdiction of Municipalities, all of which have different rules, town planning and zoning requirements, enforcing by-laws is inconsistent at best. Furthermore, while Municipalities may have good environmental laws, managers state the difficulty is in implementation and enforcement and they do not have the capacity to enforce them. Provincial government has acknowledged this as a significant problem for the coastal zone, and is addressing the issue in an effort to draft a comprehensive legislative regime for effective by-laws.

Respondents argue that there are no long-term plans with regard to managing development impacts or more importantly, to reduce development in the area. Respondents gave examples of weak compliance and enforcement from their experiences. These relate to records of decisions (RODs) being granted on the basis of the EIA process (in certain pertinent cases, even before completion), and fines and enforcement are not adhered to. They cite ‘political decisions’ as the reason, and further state that these hold the most weight in supporting development. Furthermore, as one respondent stated, “developers beef up their proposals with socio-economic benefits” which hold the most sway in decision-making. Further, some respondents claim that opposing development based on environmental impacts are often considered as racially intolerant and opposed to development. One respondent stated that “accusations of racism takes on a new meaning in the new South Africa, and is often used to dismiss genuine concerns”. Furthermore, another respondent stated that “the disproportionate weighting between development and environmental issues may pit environmental concerns in direct conflict with economic concerns in the future”.

Alternatives proposed included taking cognizance of cumulative impacts, where national level provides the legislation and the Province implement and monitor them with correct and consistent implementation. Furthermore, many respondents stress that the need to be ‘talk across Municipalities’, as collective bargaining can go a long way to achieving integration and strategic management. In addition, stakeholders assert that scientists (both natural and social) produce the tools to manage resources and impacts but there is a

bigger gap between them and government. Government only reacts after an event has happened, most notably in the case of the March 2007 storms.

The coastal zone under discussion is a typical example of the complexities associated with managing ecosystems in contexts with clearly demarcated boundaries and political structures. The north coast zone extends across three Municipalities which vary in size and socio-economic focus. Each Municipality has an IDP that guides planning and management in the area. However, in terms of integrated coastal management, it is imperative that mechanisms are put into place to ensure that all the Municipalities consult with each other in relation to the management of ecosystems, including coastal areas. It is critically important that development plans, for example, in one Municipality do not undermine overall sustainability in the north coast zone.

### **6.7 Conflicts relating to land use and development**

The areas of conflict identified by the I&AP focus group participants and the key informants of coastal managers can be summed up according to four key issues: those relating to the politics of water, the privatization of the coastline, the lack of planning in terms of agricultural land conversion and the premature sanctioning of development projects. With regard to ‘privatization’, the large-scale conversion of agricultural land (sugarcane) into eco-estates, golfing estates and huge development in the Ilembe portion of the coastline is a contentious issue. With some properties extending down to the beach, a large sector of the population (including tourists) is excluded from accessing the coast. “This is placing pressure on Municipal infrastructure at public beaches, altering access to coastal resources and ‘skewing’ recreational carrying capacities” (KwaDukuza Coastal Management, 2008: 8). According to a developer, the predominant land use in the area is intensive sugarcane farming and when a developer is granted rights to develop, it is usually with a requirement to rehabilitate features such as wetlands and can also include biological corridors to permit migration of species, as well as provide managed access to the coast. According to the developer, “we include these aspects into our developments”.

Furthermore, some developers feel that it is crucial that development be kept away from coastal dunes.

With regard to agricultural land conversion, there are concerns that this raises conflicts between housing development and high yield agricultural land. This could have significant problems from a food security perspective. Respondents claim that commercial agriculture is actually feeding the country, and its full potential is poorly understood by policy-makers. Small market gardening is also important for feeding local people at a subsistence level, as well as generating income for the local population. They suggest that more research needs to be done in this area to explore the full potential of agriculture and food security issues on this coastline. The KwaZulu-Natal Department of Agriculture (2004 cited Graham Muller Associates, 2006: 41) estimates that agriculture contributes approximately one third of the country's food output and approximately 37% of national food exports, while accounting for over 90% of South Africa's sugar production. They further suggest that there is "unrealized potential in agriculture in the province to the tune of 366% of present production and that investment in the agricultural sector creates 120% more employment than equal investment in any other sector as agriculture is a labor-intensive activity" (KwaZulu-Natal Department of Agriculture, 2004 cited in Graham Muller Associates, 2006: 41). The concerns of the respondents are also revealed in the time series analysis that shows that both commercial sugar cane and urban agricultural land use are on the decline in the area by -17.64% and -18.18%, respectively, from 2000 to 2008.

Respondents argue that there needs to be a political understanding of water usage in the area. They call for mandatory alternate technologies (such as recycling and water harvesting with tax breaks and desalinization) for all new development and stress that the notion of water harvesting needs to "get into the psyche of provincial government" (quote from one respondent). However, they argue that finance is often related to the politics of water, for example, in order to cater for the proliferation of development, it was estimated it would cost government R50 000 to develop a desalinization plant. However, the ROD decided to use available water supply instead. Furthermore, projects have been given the

go-ahead despite the concern expressed regarding the potential lack of water to serve the development. The concern regarding water is particularly acute given the golf estate development in the area. Golf estates are notoriously known to use large amounts of water.

Tourism itself is a large water consumer, as indicated by the literature. Tourism and water availability are another significant issue, often because tourists shift their water demand to other regions, often water scarce areas like coastal zones (Gossling, 2002: 284). Furthermore, they seem to use substantially more water on a per capita basis than at home, thus increasing global water demand, for example, the WWF (2000 cited in Gossling, 2002: 284) reports that the average tourist in Spain consumes 440 liters per day, a value that increases to 880 liters if swimming pools and golf courses exist, thus tourism may substantially increase the overall use of water in coastal areas (Gossling, 2002: 298).

Related to the concerns about water, respondents also indicated that other projects have been prematurely sanctioned (such as the KSIA) without the EIA being completed, ridiculous time frames set for projects that clearly need more time (the new dam to be built in the Tugela basin to provide water to the study area), without having key issues resolved (impacts on Mount Moreland from the KSIA) and the questionable nature of specialist reports (examples of which are biodiversity and employment figures). With many target deadlines being 2010, respondents claim that development is clearly moving towards an unsustainable path, which will have long-term costs to government and the people.

## **6.8 Tourism**

The KwaZulu-Natal north coast is perceived by stakeholders as an up-market tourist destination. Tourism contributes approximately R22 billion to the province annually, thus indicating its immense growth potential and influence in development. This is confirmed by many studies undertaken to assess tourist potential and trends in KwaZulu-Natal. For

example, Seymour *et al.* (2009: 19) states that “the north coast consists of about 50 to 70 kilometers of superb beaches and coastline, which has already been identified as probably having the best prospects for re-attracting higher income domestic and international tourism, given careful environmental management”. Tourism is undoubtedly a key force in the zone and its consideration is central to sustainable ICZM. The development of the airport itself is linked to tourism. However, as indicated in the literature review, tourism’s relationship with the natural environment is complex and often contradictory. This is particularly the case in relation to ecotourism which is the main form of tourism linked to the north coast. The promotion of ecotourism relies on the existence of marketable and attractive (often the more pristine the better) natural landscapes. However, ecotourism activities often undermine the quality of the very resource (the natural environment) on which it depends.

Stakeholder perceptions from tourist organizations hold that international tourism and long-haul tourism has decreased in the past two years due to the global economic crisis. Some perceptions suggest that hotel occupancy has decreased by approximately 2-5%. However, respondents identified certain categories of tourists that could be targeted for the study area despite the recession, and they are primarily northern foreign tourists (who are perceived will recover faster from the economic recession) and in particular, the older segments of the international tourist, and young, professional and single people. All these categories are potential targets as they have greater spending money and higher incomes. According to Tourism Intelligence International (2009: 9), the tourist segment likely to travel in the face of recession, include the traditionalists, adventurers and individuals. Stakeholders also stated that although domestic tourism has dropped, KwaZulu-Natal is perceived to have a higher domestic tourist visitation than other provinces such as the Western Province and Gauteng. This part of the coastline displays components of nature-based tourism and ecotourism. The main attraction, however, is the beaches. Hence, the study area holds potential for both domestic and international tourism, which is intricately linked with the area’s natural attributes. The main problems impacting on tourism identified by the respondents on the north coast are crime and the general lack of

sufficient infrastructure to support the number of people coming to the beach, particularly mass tourism.

Respondent perceptions reveal that tourists want a variety of amenities and experiences so tourist organizations and developers (who are also acutely aware of tourism trends) cannot replicate resorts with similar experiences along the coast. Respondents identified the following tourist accommodation sectors as significant (and influencing increases in up-market tourism) to encourage tourism in the area: guest houses, B&B, time-shares, the luxury accommodation linked with ecotourism and coastal resorts/ eco-estates (most notably Blythedale coastal resort which has potential for second home buyers, Zimbali eco-estate and Simbithi eco-estate). There is also a perception that eco-estates hold immense potential for second home ownership. According to Seymour *et al.* (2009: 9), many Americans are starting to follow their European counterparts in considering their vacation a birthright, and time-share is a more affordable alternative to renting vacations. Furthermore, they assert that the value proposition looks even more attractive in a down economy hence time-share represents an affordable retirement home alternative.

Respondent perceptions of tourist experiences reveal that there is a demand for events tourism, sport tourism (particularly golf), eco-tourism with a land-marine based tourism, and cultural tourism. Respondents state that there are still many avenues of tourism potential in the area that have been untapped, and include building tourism around historical and cultural sites (particularly based on Zulu culture). Golf tourism in South Africa has grown in the last few years, with a corresponding increase in the number of developments of golf courses/ golf estates. KwaZulu-Natal has eight golf clubs rated in the top 30 in South Africa, one of which is at Zimbali in Ballito (TKZN, 2005b: 3). Furthermore, in a study conducted by South African Tourism, Germans indicated that South Africa was the 8<sup>th</sup> most popular destination for golfers. Furthermore, this is translated to about 200 000 golfers interested in visiting South Africa. Again, Germany is one of KwaZulu-Natal's key source markets (TKZN, 2005b: 3).

### 6.8.2 Tourism and the environment

Table 6.6 addresses tourist stakeholder perceptions on the positive and negative correlations between land use and ecosystems in the study area, thereby presenting a stakeholder perception of a tourism risk assessment. Responses have been reinforced by findings emanating from the focus group discussions (I&APs) which also held a tourism component. The distinctions between the two groups will be highlighted in the discussion. Tourist stakeholder responses indicate that there are multiple stressors acting on individual ecosystems, and thus there is the need for a holistic view to management.

Table 6.6 Risk assessment of land use-ecology relationships

<b>Pressure Points</b>						
	Beach/ 1 <sup>0</sup> Dune	2 <sup>nd</sup> Dune/ Forest	Estuaries	Grasslands	Wetlands	Agriculture
Sea level change	<b>X</b>		<b>X</b>		<b>P</b>	
Local erosion	<b>X</b>					
Construction (tourist)	<b>X</b>	<b>X</b>	<b>P</b>	<b>X</b>		<b>X</b>
Construction (general)	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Pollution (sewage)	<b>X</b>		<b>X</b>		<b>P</b>	
Pollution (litter)	<b>X</b>					
Increase in tourists	<b>X</b>	<b>X</b>	<b>X</b>	<b>P</b>	<b>P</b>	<b>P</b>
Urban expansion	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>P</b>	<b>X</b>

X: perceptions of 100% of the tourist stakeholders interviewed

P: perceptions of proportion (unquantified) of the tourist organization population

Tourist organization stakeholders concur that the prime socio-economic benefits (and drivers) of tourism is employment creation. Furthermore, they assert that tourism is an industry that has the ability to employ people across a range of skills and education levels, from highly to very lowly skilled. In addition they agree that KwaZulu-Natal has the highest proportion of poor people and also the greatest potential for tourism. They also indicate that tourism and employment creation is strongly advocated by Government's mandate for economic growth in South Africa. However, this needs to be appropriately managed. They see benefits in integrating and working across the different sectors, stakeholders and legislation along the coast. They also indicated the need for interdisciplinary input into the tourism planning and management.

Table 6.6 indicates that a range of environmental impacts are perceived. Sea level change and local erosion are seen as an important aspect for tourism in the area, and is likely to impact negatively on the littoral zone (beach, primary dunes and estuaries) through beach loss. Furthermore, rocky shore biodiversity is rich in the area, and linked to harvesting and livelihoods, and erosion could impact on this activity. Many respondents were enthusiastic about the development of artificial reefs to make coasts safer for swimming, maintaining biodiversity, increasing tourism (especially the marine component) and reducing impacts of storms on the beach. However, some were skeptical about the physical nature of the coastline to accommodate artificial reefs. Furthermore, the biggest threat perceived to much of the coastline stems from *ad hoc* building in the beach area and primary dunes, and removal of dune vegetation. Respondents highlighted the lack of planned and adaptive management of the shoreline in response to frequency of storm events.

Perceptions on tourism construction activities) indicate that tourism activities and development are highly concentrated in the littoral zone, with impacts such as dune trampling and day-tripper littering occurring. A proportion of the tourism organizations interviewed highlighted a growing interest in marinas and water sports in estuaries, and the associated infrastructure may be, in certain cases, inappropriately cited and hence could exacerbate erosion. Tourist construction was found to be highly correlated with coastal dunes and coastal forests, and the concept of 'nature' was a strong preference for

many tourists. However, the biggest negative impact perceived are the large linear developments taking place in forests and dunes which result in public access to the beach becoming limited and problematic. Respondents in tourism organizations as well as focus groups raised concerns over the large-scale conversion of grassland and agricultural land for eco-estates and golf estates (which was looked at from a general development as well as tourist component point of view).

With regard to general development and urban expansion, both focus groups and tourist organizations felt that the citing of infrastructure such as sewer and storm water pipes were inappropriate from a flood, erosion, health and aesthetic point of view. One of the big drawbacks is the issue of water quality, which is becoming a problem along the entire coastline and will impact on the Blue Flag status of beaches and tourism in general. Respondents argue that the March 2007 floods was a stark indicator that these kinds of infrastructure need to be removed from active zones, however, they have since been replaced in exactly the same spot, despite scientific evidence of the likelihood of intensity and frequency of storms on the coastline. This indicates a lack of planned retreat (as enshrined in the NEMICMA) and a lack of a long-term planning perspective. Furthermore, there were concerns expressed by both focus groups and tourist organizations that some portions of the coastline may be over-developed and require carrying capacity management (most notably in Umhlanga and Ballito). In addition, building heights obscuring sea views were also deemed to be problematic by the respondents. In addition, demands by the tourism sector on Municipal infrastructure was also an issue that needs to be reconciled if tourism is to be sustainable. On the other hand, respondents were optimistic about the 'greening' of tourism through water and energy efficient technologies in the industry.

Many respondents from the focus group discussions and tourist organizations expressed concern over the mass beach tourism component, claiming there was lack of adequate infrastructure such as roads, parking, ablution facilities and even access in some places to accommodate this. Perceptions of crime and safety were also important criteria and affects tourism in the area, as indicated earlier.

The constraints placed on organizations to adequately address the issues and impacts associated with tourism in their localities relate to:

- Lack of funding;
- Lack of political will to engage constructively in environment-development negotiations; and
- Lack of a specific focus on employment and skills training.

### **6.9 Institutional decision-making in the study area**

This section addresses the institutional aspects of the analysis. It incorporates the perspectives of the focus group discussions. The section first addresses the criteria for institutional strength (Table 6.6) which was identified by the academic stakeholders (focus group 3), and then assesses their perceptions against these criteria. The institutional mapping comprises of two venn diagrams (focus group 1 and 2). The results are illustrated and discussed below. Figures 6.5 and 6.6 clearly reflect the community perceptions regarding the key institutions and structures in the zone from the two focus groups in relation to the Ilembe (focus group 1) and eThekweni portions of the study area (focus group 2). The venn diagrams represent the complex dynamics of actors and their levels of influence in land development in the area.

Academic stakeholders perceive institutions to be individuals and/ or organizations who are bound by ethics and/or incentives (pay) to act in the public's best interest. They stress that these two aspects need not be mutually exclusive, nor are they necessary trade-offs, however, the legal nature of an institution compels them to act in a certain way. They cite government as the most familiar institution that they know of, however, other (non-legal) institutions also exist, notably NGOs and Community-based Organizations (CBOs). According to Brody *et al.* (2003: 246), mandates for public participation are designed to increase local government commitment to the principles of democratic governance. The respondents cite a plethora of institutions (including the two mentioned) as having interests in the coastal zone. However, in relation to the term 'integrated' they argue that

institutions should include social, economic and environmental interests. Furthermore, considering the unique environment of a coastal zone, they also feel that institutions should include specialists and public organizations. They identified a range of criteria for institutional strength in the coastal zone which are identified and ranked in Table 6.7.

Table 6.7 Ranking matrix criteria for institutional strength (academic stakeholders)

<b>Criteria</b>	<b>E</b>	<b>A</b>	<b>P</b>	<b>C</b>	<b>CF</b>	<b>CC</b>
<b>E</b>		<b>E</b>	<b>ED</b>	<b>E</b>	<b>E</b>	<b>E</b>
<b>A</b>			<b>A</b>	<b>A</b>	<b>A</b>	<b>CC</b>
<b>P</b>				<b>P</b>	<b>CF</b>	<b>CC</b>
<b>C</b>					<b>CF</b>	<b>C</b>
<b>CF</b>						<b>C</b>
<b>CC</b>						

	<b>SCORE</b>	<b>RANK</b>
Ethics (E)	4	1
Accountability (A)	3	2
Precautionary (P)	1	6
Capacity (C)	2	3
Communication/facilitation (CF)	2	3
Consistent (CC)	2	3

The analysis reveals that academic stakeholders feel that institutional ethics (ranked 1) is crucially important in dealing with the public and underpins the reputation of the institution. They feel that unethical behavior diminishes the credibility of the institution and how it is perceived by the public. They also cite the same reason for consistency (ranked 3), as leading to credibility. Furthermore, they feel that whatever actions the institution takes on an issue, it has to be accountable for its actions (ranked 2). They claim that the public has a right to query accountability of an institution as public money is often spent on, in this case, development. Although precautionary behavior is ranked (6) the least important, stakeholders feel that decision-making is increasingly dealing

with uncertainty (for example, with regard to climate change impacts) and precaution has to be taken. Furthermore, it is public's money that is also linked with negative impacts. Much of the responses draw from the insights pertaining to the March 2007 floods which underscored the importance of the coastal environment. Capacity (ranked 3) was seen as significant, and relates to educational background, as well as the tools and instruments available for an individual to undertake their task, which may require inter-institutional links and support from higher level management and decision-makers in an institution. They assert that 'narrow' educational backgrounds do not take cognizance of holistic perspectives and cannot effectively deal with different community groups and may be a barrier for communication. They stress the importance of interdisciplinary educational backgrounds. Communication has been enhanced with facilitation by stakeholders, as they see that dealing with public participation is increasingly becoming about capacity building, conflict resolution and an increasingly aware public. Communication may not be efficient enough for an institution to deal with issues effectively.

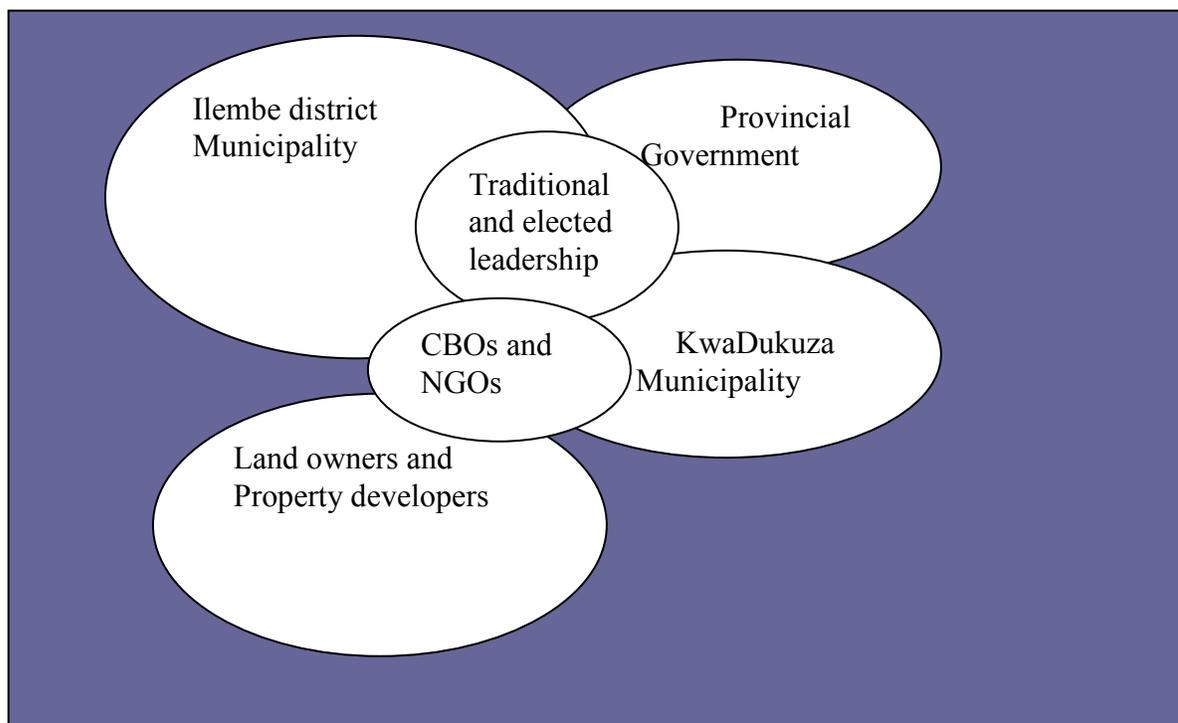


Figure 6.6 Venn diagram – focus group 1: Institutional mapping

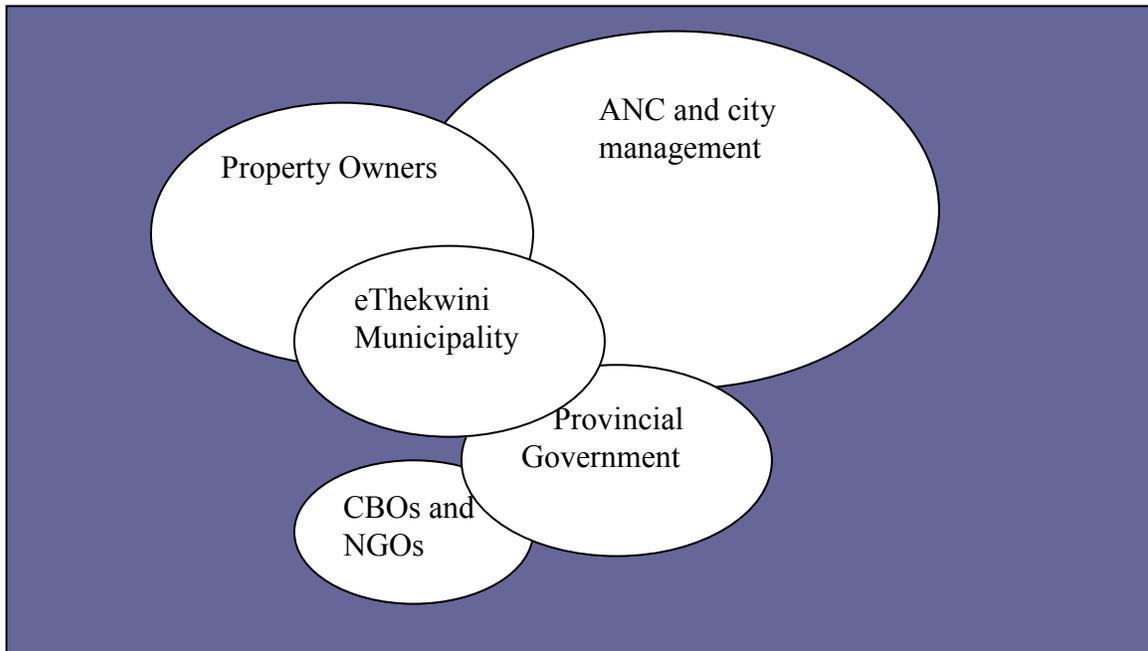


Figure 6.7 Venn diagram – focus group 2: Institutional mapping

Figure 6.6 reveals that the major institutional influences identified by the focus group participants in the area are the Ilembe District Municipality and land owners who may also either be the property developers or may sell their properties to developers. Perceptions are that property developers, through their large ownership of land and substantial contribution to the local rates base, are the dominant decision-makers in the area. Concerns are that they operate on an individualistic and profit-centered path and may not have the public's best interest in mind when developing land. On the other hand, some participants and the manager stakeholder group feels that developers are contributing to valuable community partnerships, providing employment, facilities and skills training to communities, thus contributing to corporate social responsibility. However, some stakeholders feel that developers cannot compensate for a 'sense of place' and 'historical and cultural heritage' lost when they relocate people whose families have settled on land since the time of the indentured laborers, as was the case when the Blythedale Coastal Resort was developed. They conclude that their interests are not given enough weight in decision-making in determining how land is allocated and used. The

term ‘land suitability’ is determined by both the fitness of the land for a particular use and the values and interests of the stakeholders in a region (Bojorquez-Tapia *et al.*, 1994 cited in Bojorquez-Tapia *et al.*, 2001: 130).

Stakeholders feel that the Ilembe District Municipality has a stronger presence in major land use decisions than the KwaDukuza Municipality. Furthermore, Ilembe and KwaDukuza Municipalities are indicated as separate entities with no link between them, suggesting that there is lack of cooperation between them. Respondents felt that the KwaDukuza Municipality affords them better service. According to a developer, “the KwaDukuza Municipality is reasonably well equipped and staffed to process and manage development”. Furthermore, as the instrument that guides planning at the local level, respondents feel that the IDP was drafted without effective consultation and local issues are not reflected in this document. Furthermore, an SEA has been done for the KwaDukuza Municipality, but stakeholders are unsure of its value for two reasons: the lack of consultation and it is still to be tested. While Provincial interests do occur in the area, they are seen as detached from the general public. Since some of the land on the northern part of the study area is held under forms of traditional leadership, there are tensions between traditional and elected leaders regarding land issues, with conflicts between the African National Congress (ANC) and Inkatha Freedom Party (IFP) over decision-making.

In Figure 6.7 respondents identified two major groups as the most influential: property owners as well as the ANC and City management. This immediately links management of the area with a political party. The perception is strong that there is little difference between the two, and that many decisions made are political decisions. For example, the sand budget to maintain Durban’s beaches (which are maintained through dredging) ranges into mega tonnes but the financial budget is hidden. Furthermore, press releases are not always accurate. Additionally, respondents reveal that where science provides the knowledge (for example, the CSIR), it is not adhered to in important cases. For example, the City of Durban management had been warned about high nutrient levels in the Durban harbor (this occurred in 2008 due to a sewer pipe leak but was attributed to

general organic pollution by management), but they did nothing. It is also important to note that respondents have classed two management structures (ANC and City management as well as the eThekweni Municipality) as separate, when management ought to be the same, indicating the lack of intra-governmental cooperation. Developers, one in particular, is a major land owner in the study area and hence respondents claim that “they could be the local authority”, due to their monopoly over land decisions such as where and when to release land for development, including how the land should be used.

The role of Provincial government in the study area was perceived differently by different respondents; however, its presence is noted. Reference was made to the Provincial coastal committee and questions about how effective they really are were raised. Some respondents alluded to the fact that they are active, however, they lack inter-governmental cooperation, for example, with the Department of Minerals and Energy (DME) over the sand mining issue, which is responsible for removing sediment from rivers and estuaries on the coastline. Respondents say that public participation is low, that is, while CBOs, NGOs and community forums are represented, they are not listened to. Again reference was made to several RODs which were granted without complete specialist studies, inappropriate time-frames and before important social and environmental issues were resolved. The Provincial lead agent for environmental assessment is the Department of Agriculture and Environmental Affairs (DAEA). Hence respondents feel that public participation is conducted merely to legitimize decisions taken at higher levels. However, respondents are optimistic that a few NGOs (for example, the Wildlife and Environmental Society of South Africa – WESSA) are starting to influence government.

Planning scholars have argued that citizen participation can generate trust, credibility, and commitment regarding the implementation of policies and can build social capital (Innes *et al.*, 1994 cited in Brody *et al.*, 2003: 246). Furthermore, including key parties early, often and throughout can create a sense of ownership over a plan’s content and can reduce potential conflict over the long-term, because those involved feel responsible for

its policies (Wondolleck and Yaffee, 2000 cited in Brody *et al.*, 2003: 246). Furthermore, organizations and individual participants bring valuable knowledge and innovative ideas about their community that can increase the quality of adopted plans (Forester, 1999; cited in Brody *et al.*, 2003: 246).

## **6.10 Policy review**

This section looks at the most important policies that stakeholders perceived to be the key drivers of change in the area as well as the main policies influencing the management of the area. These policies were:

- The Accelerated and Shared Growth Initiative (ASGISA);
- The Provincial Economic Development Strategy (PEDS);
- The National Spatial Biodiversity Assessment (NSBA); and
- Integrated Development Plans (IDPs) and Land Use Management Systems (LUMS)

This policy review starts by discussing the criteria selected by the academic stakeholders (focus group 3) against which the performance management of the policies will be assessed (Table 6.8). It then discusses and analyzes the policies in relation to an assessment policy matrix (Table 6.9) derived from the I&AP focus group discussions 1 and 2, key informant interviews and secondary data. The policies identified by stakeholders have been discussed in chapter four and this analysis merely provides a critique.

Table 6.8 Multi-criteria for policy analysis (Focus group 3)

<b><i>Criteria</i></b>	<b><i>Description</i></b>
Strategic and context specific	Wide geographic area Cumulative and off-site impacts Land-marine link
Public participation at every stage (Life-cycle of project)	Consultation with I&APs Disclose budgets Broadens scope for consideration of different alternatives and trade-offs Indication of positive and negative impacts
Networks and links	Between different institutions, the public and international policy
Resources	To implement the policy Monitoring and compliance Capacity Money
Precautionary	Uncertainties Information gaps Reliability of information Mechanisms to deal with externalities.
Prioritize issues	Important issues (poverty, climate change and biodiversity) Budgets Time-frames Deliverables
‘Decision windows’	Change Adapt Research

Respondents stated that a broad perspective that is context specific is required. While this is easier done at a local level, national policies need to holistically account for differences in different contexts, for example, coastal processes. This has to correspond with the appropriate action that an issue requires. Furthermore, a wide geographic area is important because most pollution sources occur up-stream and off-site in the coastal zone, although the impacts may be felt locally. A bigger geographic area also allows for the identification of cumulative impacts. This may necessitate Municipalities to work together as cumulative impacts may cross boundaries. The land-marine link is important because often it is land-based issues that affect the marine environment. Public

participation at each stage of the policy is important because it instills ownership and facilitates trade-offs. An important aspect of policy should also indicate how local people benefit from the policy. As moves towards sustainable development become more entrenched, there is a need to go beyond job creation and build capacities.

The importance of networks is seen to be significant in terms of information-sharing, eliminating duplication and encouraging learning from different perspectives, thereby adding value to a policy and ensuring it does not evolve in a vacuum of knowledge. According to Celliers *et al.* (2007: 367), the benefits claimed from collaboration include “the moral imperatives that assert that it is the only solution to complex social problems, that it promotes coordination and efficiency, the sharing of learning and the transfer of good practice”.

Resources are important in order to efficiently put the policy into operation. Sources of funding need to be indicated, as well as partnerships formed in sourcing funding. Respondents cite problems with past donor funding as something to be cautious about. Respondents highlight once again the importance of precautionary decision-making. Respondents stated that prioritizing issues is important to focus the policy. However, they state that prioritizing does not mean dealing with what is perceived as important, but what actually is. They often indicated that policies (depending on the perspective driving them), focus on single issues (for example, poverty or biodiversity) but do not make the link between poverty and biodiversity or climate change. They claim that very few policies can afford to focus on single issues. They include the importance of ‘decision windows’ as points in the policy process where, in light of new information or problems, there is a chance to make necessary changes thus policy becomes an informed and adaptable learning experience.

This analysis uses the above criteria to undertake an assessment of relevant policies in relation to whether they are achieving their desired goal, and how the environment, which supports socio-economic development, is perceived in the long-term in relation to integrated and strategic planning.

### ***6.10.1 Critique of identified policies***

“One of the major challenges facing government in its quest to provide basic services to all its people, progressively improve the quality of life and life chances of all South Africans and eradicate the dualistic nature of the South African economy, has been the effective integration, coordination and alignment of the actions of its three constituting spheres” (Policy Coordination and Advisory Services, 2004: 1). As a result, major policy instruments have been developed; including a range of Acts, policies, strategies, development planning instruments, integration mechanisms and structures aimed at ensuring that intergovernmental priority setting, resource allocation and implementation take place in an integrated, effective, efficient and sustainable way (Policy Coordination and Advisory Services, 2004: 1).

The most important policies influencing the activities on this coastline have been identified by stakeholders as the Accelerated and Shared Growth Initiative (ASGISA of 2006) at a national perspective which filters down to the Provinces in terms of the Provincial Economic Development Strategy (PEDS) of 2006, which feeds into the Municipal IDPs. These policies build on and reinforce ASGISA priorities in terms of transforming the Provincial and local economic structures by pursuing growth and development through investments (especially in terms of corridors and sector development), broader participation in the economy, and reducing poverty and job creation. Critical in this regard is “to eliminate the inequalities, inefficiencies and wastage of the apartheid space economy” (Policy Coordination and Advisory Services, 2004: 1).

#### ***6.10.1.1 Accelerated and Shared Growth Initiative (ASGISA)***

The overall goal of ASGISA is to halve poverty and unemployment by 2014 by eliminating the first and second economies. Furthermore, ASGISA adopts a normative framework and places priority on human development. Major critiques from stakeholder respondents of ASGISA relates to the large-scale projects that the policy advocates, such

as rail transport, harbors, an oil pipeline and dam projects. These projects require the conversion of large tracts of undeveloped land and ecosystem services are compromised. According to DEAT (2006b: 4), ecosystem services are not captured in national economics in South Africa. Other concerns relate to the immense pressures from infrastructure development on the country's natural resources. According to DEAT (2006b: 4), there appears to be little dialogue between environmental and economic knowledge in the ASGISA mandate. Furthermore, stakeholders state that ASGISA appears to have set agendas, with little room for dialogue. ASGISA priorities reflect a clear economic agenda with little environmental focus.

It is interesting the stakeholder concerns are echoed by a government department, DEAT. This implies that while components of government recognize the inadequacies of the key policies driving development in South Africa in relation to incorporating environmental considerations, there remain serious blockages in terms of addressing these policy gaps. This is reflective of the 'silo' mentality that government departments have been critiqued of, that is, departments rarely work together and there is very little synergy between the various government departments from the local to national levels. Already this study has illustrated that Municipalities which make up the north coast under consideration do not align their plans to ensure ICZM which often results in the natural resource based being undermined. Additionally, national government departments who are responsible for overarching State policies do not adequately consult with each other when developing major policies such as ASGISA.

Networks are based on partnerships with sectors like tourism, agriculture, business, labor and infrastructure providers (Eskom and Transnet). While ASGISA mentions youth and women, there is a dire lack of consultation on biodiversity and climate change when these projects are often dependent on biodiversity and are expected to generate large quantities of pollution, including air pollution. Budget figures are quoted in ASGISA and Foreign Direct Investment (FDI) is mentioned, but there is no scheduled budget breakdown or nature of the relationship. ASGISA is marketed as a strategic policy, however, some of the stakeholders in this study claim that ASGISA fails to demonstrate characteristics of a

good strategic policy. Strategic policies look at the area to see what's there (both physical and human systems), as well as the potential in the area, the benefits and cumulative impacts. It is essentially a stock-taking of the potential in the area for the greater good and for the longest benefits for the area. According to DEAT (2006: 4), the NEMA makes provision for a number of strategic tools for national planning such as SEA, State of Environment Reports and the NSBA which provide for more pro-active approaches to the management of development impacts, and the formulation of mitigation strategies to minimize the scale of the negative impacts wherever they may exist. ASGISA does not effectively appear to have the strategic focus it claims to with no strategic tools identified and it fails to provide a critical assessment of impacts, especially in the longer term.

#### ***6.10.1.2 Provincial Economic Development Strategy (PEDS)***

The focus of the PEDS relates to increasing investment in the province, improving skills and capacity building, broadening participation in the economy and increasing the competitiveness of the region (City of Umhlatuze, 2008: 5). The PEDS, for the province of KwaZulu-Natal has clear spatial and geographic contexts, in this case the study area falls within the eThekweni/ Umhlatuze Provincial priority corridor. However, respondents claim that there is no link between the land-based activities (projects) and the specific nature of the coastline, or the marine interface, especially since these projects are expected to generate vast quantities of pollution and are a threat to estuarine and marine environments. They make reference to the KSIA and other infrastructure projects in the area as a direct violation of the coastal protection zone (as advocate by NEMICMA) which calls for strict development control of all land 100 m inland from the high-water mark in areas that have already been zoned for development and one kilometer inland in other areas. Furthermore, the NEMICMA states that these projects will require stricter EIA procedures. However, the rapid timeframes for EIA and ROD raises questions in relation to the sustainability of these projects.

They also state that projects like the KSIA and DTP's operational costs may be only a portion of what is actually required, and the true financial costs may be more than what is

projected. Furthermore, there is little link between the types of development projects and their compatibility with biodiversity. The NSBA makes reference to threatened ecosystems, which are not considered in the planning of these projects. Furthermore, the White Paper for Sustainable Coastal Development in South Africa conducted a valuation of the direct and indirect value of coastal ecosystem services to the national economy (DEAT, 2000a: 119), which can potentially feed into the PEDS. Furthermore, the White Paper makes reference to direct benefits gained from coastal resources, which effectively refers to the second economy (for example, harvesting and fishing) which these economic policies are attempting to eliminate, thereby undermining social and economic security and human development and well-being for coastal communities that engage in these activities.

#### ***6.10.1.3 National Spatial Biodiversity Assessment***

In South Africa, the NBSAP views EIA as a limited tool for influencing decisions on changes in land use (DEAT, 2005 cited in de Villiers *et al.*, 2008: 1). The NBSAP justifiably favors SEA to EIA. This suggests that it adopts a strategic view of biodiversity. In common with most of the literature on ‘biodiversity mainstreaming’ in South Africa, the NBSAP advocates the integration of biodiversity priority areas with spatial plans at the Provincial and Municipal level (de Villiers *et al.*, 2008: 1), and includes both land, marine and estuarine areas. The assessment also recognizes that biodiversity cannot be conserved through protected area networks only, and specifically highlights the need for local government to build biodiversity issues into the Integrated Development Plans (IDPs) (Kuntonen-van’t Riet, 2007: 18).

According to Lutsch (2008), the NSBA concept document finalized in 2002, includes aspects on sources of funding (Global Environment Facility - GEF - funded US\$448 080) and time-frames which stipulates that DEAT was the driver of the process from May 2003 to 2005. Furthermore, it sets priorities for conservation and stakeholder involvement (which in the international biodiversity arena is regarded as being ongoing) in aspects pertaining to policy and legislation, institutional capacity, social aspects of

conservation, sustainable use, economics and poverty alleviation, and access and benefit sharing (Lutsch, 2008). Furthermore, it makes links with the economy, biodiversity and society. The major limitation pertaining to the policy is the lack of integration between this policy and other economic policies, such as ASGISA and the PEDS.

Table 6.9 Assessment for policy pertaining to the coastal zone

<b>Indicators Concerns for Strategic coastal zone management</b>	<i>ASGISA</i>	<i>PEDS</i>	<i>NSBA</i>	<i>IDP and LUMS</i>
<b>Strategic and context specific</b>	--	--	X	P
<b>Public participation</b>	P	P	X	P
<b>Networks</b>	P	P	X	P
<b>Resources</b>	X	X	X	P
<b>Precautionary</b>	--	--	--	--
<b>Prioritize issues</b>	X	P	X	P
<b>Biodiversity</b>	--	--	X	P
<b>Climate</b>	--	--	X	P
<b>Poverty</b>	X	X	X	X
<b>'Decision windows'</b>	--	--	X	--

X: full compliance with criteria  
P: partial compliance with criteria  
--: no compliance

#### ***6.10.1.4 Integrated Development Plans and Land Use Management Systems***

According to DAEA (2003 cited in Kuyler, 2006: 31), the principles for sustainable environmental development and the integration of biophysical, social and economic considerations as described in Chapter 1 of NEMA must be included in the development of an IDP. The incorporation of the following are therefore considered to be important in an IDP (DAEA, 2003 cited in Kuyler, 2006: 31):

- Identifying environmental degradation and environmental risks;
- Involving competent stakeholders in charge of environmental concerns;
- Making sure that environmental opportunities, problems and threats are reflected;
- Assessing alternative strategies by considering environmental impacts;
- Considering environmental aspects when designing projects; and
- Ensuring compliance with environmental policies and legislation.

Respondents from the focus group discussions (1 and 2) largely concur that the focus of the IDPs is on infrastructure provision and service delivery. They also expressed concern over whether Municipalities will have the capacity to handle the scale of development taking place. Atkinson (2002: 22) argues that IDPs were often written by consultants, who are typically town planners or engineers, and their professional training does not always make them suitable to assist with writing developmental plans, hence, depending on the professional orientation of the consultants, some IDPs are primarily spatial plans, while others are primarily infrastructure plans. Similarly, capacities within Municipalities regarding the assessment of biodiversity are lacking, and environmental functions and/or assessments in terms of the development of IDPs are outsourced. Respondents state that often aspects such as biodiversity and coastal risk are simply written into IDPs with no adherence to the recommendations. Respondents also state that LUMS do not consider coastal opportunities and coastal sensitivities specifically related to coastal issues, for example, building densities. Furthermore, many Municipalities, including those who are ANC-affiliated, have embraced the technocratic vision that informs the neoliberal model of economic transformation, although there are some redistributive elements (Heller, 2001: 15). In this view, “the high social costs that accompany market reforms call for

minimizing political interferences (which inevitably introduces unnecessary friction and ‘populist’ demands for redistribution and increased social expenditures) and maximizing the decision-making autonomy of technocratic elites” (Heller, 2001: 15).

Furthermore, respondents argue that the IDP does not incorporate views of the community and although it goes through motions of public participation, it does not actually consider the views of the public. Although issues are given priority, respondents were unsure of the processes used to develop these priorities, indicating a lack of transparency. In terms of the Municipal Systems Act, a Municipality “must develop a culture of Municipal governance that complements formal representative government with a system of participatory governance” (Municipal Systems Act, 1999 cited in Atkinson, 2002: 23). The Act makes it clear that residents have the right to contribute to the Municipality’s decision-making processes as well as the right to regular disclosure of the state of affairs of the Municipality, including its finances (Municipal Systems Act, 1999 cited in Atkinson, 2002: 24). As stated by respondents (focus groups 1 and 2) in earlier discussions, this is severely lacking in IDPs. Respondents also state that strategic leadership is often missing in Municipal leadership.

#### ***6.10.1.5. Overall assessment***

International policy perspectives, have, in the past decades, witnessed drastic changes in the context and contents of policy analysis, with the conventional optimization paradigm increasingly being replaced by procedural or accountable modes of planning, in which a great variety of different motives and policy orientations play a role (Nijkamp and Vindigni, 2000: 2). These include taking cognizance of aspects such as long-range uncertainty (technical, social and financial) and the lack of social consensus and conflicts amongst actors (Nijkamp and Vindigni, 2000: 2). None of the policies reviewed adequately considered these aspects, according to the respondents. In fact, not a single respondent felt that any of the policy reviewed outlined precautionary principles.

Despite the policies impacting on the study area being advocated as strategic, the policy review exhibits distinct characteristics of comprehensive planning, suggesting that major policies are emerging as ‘blueprints’ and master plans, where the environment is rationalized in development planning. According to Lawrence (2000: 608), the process of rationalism (survey, analysis and plan), and the product (the plan), indicate an undeniable association and displays the following typical characteristics:

- Autocratic tendencies (‘experts’ dominate process with peripheral role for public) and provision is usually made for public involvement in the process, usually focused prior to major decision points;
- Fails to consider resource and cognitive limits;
- Overestimates ability to predict and control the environment (weak on implementation);
- Insufficient consideration of non-technical and non-scientific knowledge, experience and wisdom (scientific, technical and quantitative bias);
- Fails to adequately consider the collective nature of planning and the central role of dialogue;
- Fails to consider inequities and the political nature of planning (may reinforce inequities); and
- Fails to integrate substantive issues (for example, social and environmental needs) and to design the process to suit contextual characteristics.

The planning in the study area, as reflected on by respondents and key stakeholders, displays typical characteristics of master planning. The assessment of the policies reveals that there are more costs to society and the environment (cumulatively, the loss of ecosystems and their services) than there are benefits (such as the potential for job creation) and hence ASGISA’s operating under the guise of normative planning is misleading. Furthermore, this form of planning is a direct threat to ICZM efforts in the area as development. Although good strategic legislation exists, such as the NEMICMA and the NSBA, economic policies driving development in the area and which are clearly dominant in the study area do not give due consideration to environmental concerns and there is very little synergy between the different major policies.

## **6.11. Conclusion**

This chapter has analyzed and attempted to demonstrate how land use and cover change on the KwaZulu-Natal north coast has produced important socio-environmental impacts and conflicts. The time series of land cover and use revealed declines (in an eight year period) in most of the major land cover types (especially ecosystems) in the area. Furthermore, all forms of agricultural activity is also declining, thereby compromising future food security and employment opportunities in the area, as the majority of the population is in the unskilled sector. Most of the changes are noticeable from 2003 to 2008 which implies that these are recent (and relatively rapid). Of concern is also that a trend is clearly discernible which suggests that the changes are likely to continue in the near future. The phenomenal increase in sealed services indicates that this coastline is effectively becoming an anthropic coast, where natural ecosystems are being rapidly replaced by built infrastructure. Matters are compounded further due to the emerging inadequacies of management and managers to deal with coastal change, development and stakeholder conflict that arises from the interaction between them. What is also becoming increasingly clear is the need to move beyond the assessment of the biophysical environment, to an analysis of decision-making in the study area.

## CHAPTER 7

### Summary, Conclusion and Recommendations

#### 7.1 Introduction

The main aim of this research study was to investigate the effectiveness of the integration of spatial analysis in SEA (particularly its ability to identify and predict ecological impacts), on the KwaZulu-Natal north coast of South Africa. In this chapter, research objectives and hypotheses postulated will be discussed with reference to the key research findings and results of the previous chapter. Recommendations, including the identification of future areas of research will be forwarded. Finally, overall concluding remarks will be presented.

It is important to note that this thesis was based on a detailed examination of a case study, the KwaZulu-Natal north coast, as an example of pertinent issues and concerns related to SEAs in the context of ICZM and the importance of adopting a spatial analytical approach when examining land use and cover change, key drivers of change in coastal areas, management issues and future scenarios. Case studies are based on the premise that they reveal issues and concerns that are likely to be pertinent to similar contexts. In this instance, the north coast case study exemplifies issues relevant to coastal zone management. This chapter therefore also focuses on the broader issues and trends relevant to ICZM and SEAs.

#### 7.2 Summary of key findings

This section indicates the links between the key findings emerging from the analysis and the objectives and hypotheses of the study. The objectives are first discussed followed by the hypotheses.

Objective 1: To determine the biodiversity patterns in the landscape of the study area.

The study adopted a broad-scale approach to elicit information that was considered important to provide holistic information for the future management of the area. Furthermore, the study found that there were many drivers that were immediately beyond the boundaries of the study and were significant from a biodiversity perspective, such as the KSIA and DTP, which has important international biodiversity implications in terms of the Ramsar convention. Hence, this area was incorporated into the extended boundary of the study. While a time series analysis was adopted to provide quantitative trends in landscape change, they do not provide the underlying qualitative motivations and perceptions for such change. A participatory framework encompassing broad-scale land use and cover types, based on stakeholder perceptions was an important complement to this study. To this end, focus group discussions emerged as highly interactive tools to facilitate lively debate on key issues addressed in the focus group schedules.

Land use and cover hierarchies of classification were included which were deemed as easily communicative to all stakeholders, including non-specialists (Table 5.4). Importantly, stakeholders identified the inclusion of the littoral zone which is increasingly becoming an important issue in terms of coastal erosion, biodiversity and access along the South African coastline. The results of the time series change analysis from 2000 to 2008 (summarized graphically in Figure 7.1) revealed that major natural land cover classes are in decline in the study area, for example grasslands (-19.99%), coastal forest (-40%), wetlands (-37.49%) and secondary dunes (-21.44%). Furthermore, agriculture and forestry are also indicating severe declines, with commercial sugarcane at (-17.64), urban agriculture (-18.18%) and commercial forests at a decline of 33.34%. Stakeholder input revealed possible reasons for these trends, which are resulting in the overall decline in the coastline's natural resource base and primary sector activity (the second economy). The reasons attributed to this transformation of land cover are increasingly being linked with economic motives such as individual private land owner dynamics, tourism growth and development in the area. Furthermore, the policy agendas are clearly economically motivated.

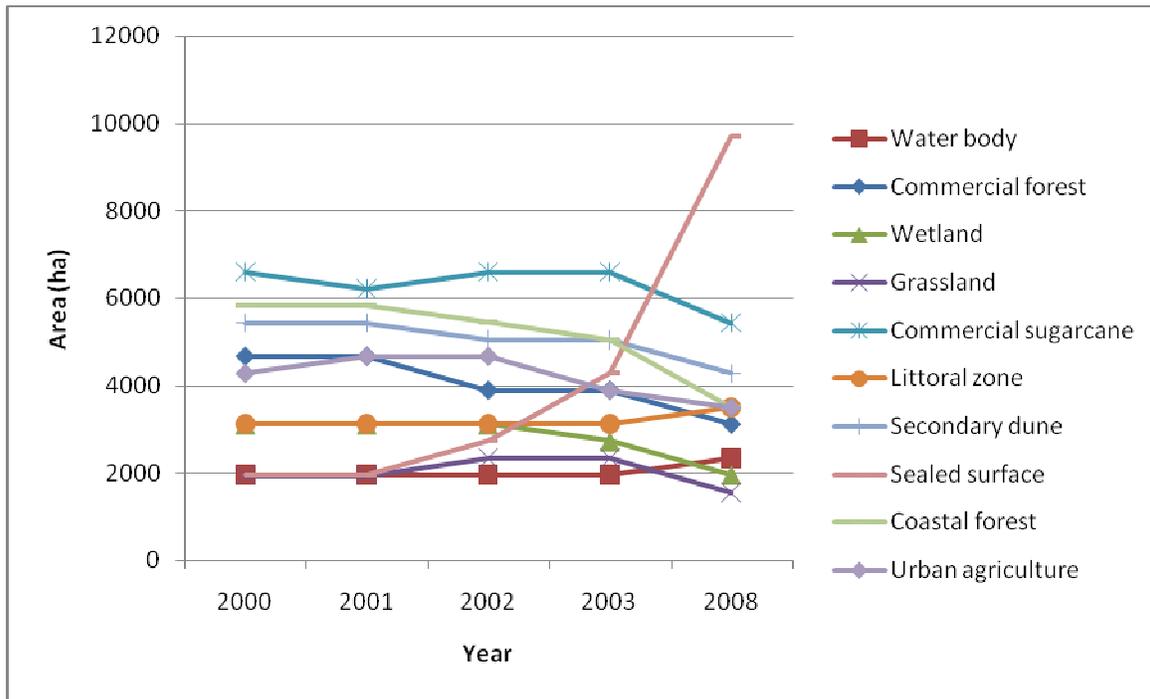


Figure 7.1 Land use and cover changes 2000-2008

Conversely, the most predictable increase in land use has been the increase in sealed surface, by 80% between the years 2000-2008. Although the satellite imagery for 2008 indicates that the most significant increases in sealed surfaces are occurring in the northern sections of the study area, the population figures indicate a decline in the area of approximately 2.83% between 2001-2009 (Table 6.1). Hence, this indicates that the sealed surfaces can probably be attributed to commercial and/or industrial development rather than residential development. Also, the satellite imagery indicates a preference for shoreline development, indicating that proximity to the ocean is a huge determining factor in location. The other increases were in relation to water bodies (+19.99%) and littoral zones (+11.11%). Since key stakeholder interviews, secondary literature and focus group discussions unanimously regard lack of natural sources of water a crisis in the area, these increases were attributed to the rise in the use of landscaping using water features, as indicated by several eco-estates in the area. Water issues are clearly emerging as a high priority concern in the area, and could potentially constrain long-term

development of the area. The increase in littoral zones is a positive aspect, and indicates the relative health of the zone. However, with trends indicating aggregation towards the land-marine interface, this could compromise the future health status of the littoral zone. It is important to note from Table 6.2 and Figures 6.1, 6.2 and 6.3 (as well as Figure 7.1) that most of the changes are noticeable from 2003 to 2008. The changes are therefore recent (specifically in the last five years) and are very significant. What is also of concern is that there seems to be a trend in the changes for the last five years, that is, while most ecosystems and agricultural land uses in the area are declining the extent of sealed surfaces are increasing rapidly.

Furthermore, key land use indicators (Table 5.1) were chosen and were based on use, function and perception. These are important criteria for stakeholder inclusive planning and management of the coastal zone. Furthermore, stakeholders identified that this particular coastal landscape is made up of rural, peri-urban and urban areas, and all these landscape peculiarities are important complementary and synergistic elements that needed to be included in the planning and management of the study area. For example, the loss of high potential agricultural land to housing development is a major departure of conflict in the area. On the one hand, agriculture is perceived to be feeding the nation, however, the coastline is being developed on the premise of redressing past spatial patterns of inequality by bringing people closer to places of employment opportunities.

Another aspect which emerged from the study is the significance of and contention over maintaining the 'urban edge' in terms of meeting municipal capacities for infrastructure provision. These issues challenge the traditional management advocacy for limiting 'urban sprawl', which is also a major preoccupation in international literature on land use management in coastal areas. The likely trade-offs in each of the issues identified are a potential area for future research.

Objective 2: To determine locations of possible future ecological pressures.

Ecological pressures in this coastal landscape are inherently linked to and exacerbated by key drivers in the study area. The existing and emerging drivers were identified as the KSIA and associated DTP, eco-estates, office and/or commercial development along major road networks, low cost housing, tourist development, infrastructure development (and provision), high-income residential accommodation/ and second homes and informal settlements. These findings correlate with the general overall trends in South Africa (as indicated by the literature), that the key pressure points impacting on coastal environments are the large and growing coastal populations, the net in-migration of people seeking jobs, the appeal of living at the coast and the increase in coastal holiday homes and resorts and demand for recreation and tourism associated with the coast. The study reveals that the population is likely to increase in the area as the provision of investment (Figure 6.4) increases. In particular, it is the low-income and/or informal component that is likely to increase as job opportunities increase in the study area. Poor and marginalized people rely significantly on the natural resources base. In this particular area, it could lead to unsustainable utilization of coastal resources such as forests and biodiversity for natural resource harvesting. Furthermore, informal settlements in South Africa are generally located near water sources such as rivers and estuaries, and the dire lack of sanitation facilities could impact negatively on these rivers. It is therefore imperative to consider proper service and infrastructure provision for the very possible likelihood of increases in this sector of the population. The study also reveals that each of the other drivers such as the high-income residential sector and tourism are also impacting on key ecosystems. The biggest draw-card being the relatively unspoilt coastline including coastal forests, which appeals to the high-income and tourist sectors for general residential, second homes and tourist accommodation. Much of this type of development is occurring in a linear fashion along the coastline, with no cognisance of the inherent limitations of the ecology in the area to support such development. Furthermore, the underlying factor promoting massive investment is driven by policy, which, as demonstrated in the analysis, has limited consideration of ecological systems and conservation zones. The map (Figure 6.4) visually illustrates that almost the entire

coastline under consideration is or will be under some form of cumulative development pressure resulting from existing or planned investments in the area. This affirms the importance of adopting an SEA approach.

Objective 3: To determine how the products generated from the research could assist in informing decision-making.

Several products were generated from this research that could aid in future decision-making along this coastline. The spatial aspect was significant as it visually depicts areas perceived by stakeholders as biodiversity ‘hotspots’, potential no-go areas for development exclusion and resilient areas (Figure 6.2). The analysis reveals that while investment is a necessary consequence of development, these two issues need not be in conflict with each other. Several stakeholders advocate maintaining links between ecological functionality and sustainable socio-economic development. For example, Figure 6.2 reveals that important landscape features such as the dune cordon, where undeveloped, should be maintained. Furthermore, they identified the majority of the biodiversity hotspots as being located along the rivers and where coastal forest occurs. Furthermore, since the majority of grassland area is under threat, they suggest managed development. Important aspects emerging from this analysis is the maintenance of ecological corridors in both the terrestrial and aquatic environments. The visual product/map could aid decision-making in streamlining further project EIA in the study area. Furthermore, the revised EIA regulations have made accommodation for sector guidelines and EMFs, which are strategic tools. The findings can potentially contribute to aiding in decision-making regarding determining the best suitable use of this coastal land/landscape.

Furthermore, a risk assessment was undertaken for the tourism sector, and importantly, largely by the tourist sector itself. The responses indicate that there are multiple stressors acting on individual ecosystems, and thus there is the need for a holistic view to management. While the potential for tourism is high in the study area, with various options for diversification of both high-income and mass tourism, there needs to be

appropriate management of this sector. The literature suggests that the tourism footprint is larger than the industry itself, and this was highlighted in the risk assessment and stakeholders were able to appreciate the potential benefits of integrating and working across the different sectors, stakeholders and legislation along the coast, with regard to tourism and its associated development. Literature on any coastal zone management, and certainly in the literature in this study, indicates that coastal zones are areas of high sectoral conflict. Furthermore, the purpose of 'integration' in ICZM is to optimize relationships between coastal uses and the protection of the coastal ecosystem; and a normative approach to ICZM with an agreed acceptance of the sustainable development principle as a cornerstone within all national and international policies (Banica *et al.*, 2003: 28). A risk assessment of specific industries can aid in finding synergies between sectors, avoid duplication of information and enhance collaboration between sectors with a stake in coastal zones.

The study has used a multi-criteria approach in the various ranking matrices to identify possible and/or likely trade-offs. As trade-offs are a reality in any management activity, it is important that the criteria be developed by those who are most likely to be affected by such decisions. The policy review also adopted a multi-criteria approach against which the performance management of the policies was assessed against (Table 6.8). The criteria list is comprehensive, and while it may not be suitable for all contexts, it does provide a methodology for inclusion for policy analysis in decision-making. According to the literature review, the process of ICZM covers the full cycle of information collection, design of planning, decision-making, management and implementation (Banica *et al.*, 2003: 35; Olsen, 2003: 384; Gremmenas 2005: 27). Furthermore, it is also iterative, as dynamic systems are in continuous need of review and adaptation to new conditions, so that the cycle has to be started once again, which is in keeping with the notion of the systemic view of the dynamic coastal processes (Olsen and Christie, 2000: 10; Banica *et al.*, 2003: 35). This indicates that policy-making, execution and monitoring needs to be a continuous and adaptable process, hence, the importance of selecting criteria, against which to assess and inform policy.

The study also makes use of venn diagrams to illustrate the complex number and dynamics of actors, and their levels of influence in land development in the coastal zone. This method visually illustrates the power and decision-making dynamics and individuals that the community perceives to be influencing decisions at the local level, especially as they relate to coastal zone management, policy-making and developments in the area. The venn diagrams also aid in understanding the roles of the local and outside organizations and the perceptions that stakeholders had about them. This tool can be enhanced and integrated into coastal planning to assess possible actors who are in conflict with or enhance coastal management at the local level. It can also be used to identify key stakeholders, which has been highlighted as critical to effective ICZM and SEAs.

In relation to the hypothesis postulated in the first chapter, both can be accepted as discussed below:

- SEA which is properly integrated and informed with spatial data can assist in contributing to sustainability by meeting regulations and recommendations on biodiversity and sustainable development.

The data analysis underscores the importance of adopting a spatial analytical approach. The examination of stakeholder perceptions as well as the time series analysis reveals biodiversity hotspots and pressure points to be considered in terms of future planning and development in the area. Furthermore, the policy review indicated the importance of development policies in particular such as ASGISA and PEDS, that is, the key driver of change in coastal areas, to adequately and synergistically consider environmental impacts and concerns. The maps (both the time series and participatory maps) emanating from the study visually illustrate the significant changes in the spatial environment and suggest likely future locations of contestation and concern.

- Spatial analysis can inform good governance that contributes to sustainable development.

The study clearly reveals that a spatial analysis that incorporates the biophysical, political and socio-economic aspects can be an effective management tool that promotes good governance and sustainable development. The data analysis

reveals that significant amounts of information can be captured using GIS (particularly in relation to land use and cover) and participatory mapping (especially in relation to including socio-economic and political dimensions and concerns). By adopting a broad spatial approach that integrates the sciences and social sciences as advocated in the conceptual framework used for the study a holistic perspective is provided that permits more informed decision-making and creates spaces for the views and concerns of a range of stakeholders.

### **7.3. SEA Framework**

One of the main considerations in this research endeavor was to formulate an SEA Framework to inform future ICZM in the study area. SEA is planning with a long-term perspective, with a focus on a spatial rather than a project level, an element that is clearly lacking in the current development scenario of this coastline. It is critical that the SEA advocated in this study include a range of variables that will permit short-term, medium-term and long-term monitoring and evaluation aimed at ensuring sustainable planning in the area. The proposed Framework can also be used in other coastal zone settings to ensure strategic planning and interventions. It should be noted that the study was not intended to undertake an SEA but to develop an appropriate Framework for an SEA of the north coast to be undertaken in the future.

The SEA indicators presented in Table 7.1 are derived from the literature review as well as the data analysis which indicate the main drivers and concerns that impact on coastal zones. Due consideration was given to the heterogeneity of the area in relation to biophysical, social and economic dynamics. Furthermore, Sardá *et al.*'s (2005: 430) recommendations in relation to indicator selection were considered in that the information needed should be collected for existing organizations and should be easily accessible, quantifiable, reliable and collected periodically. The indicators are presented in Table 7.1 below using the key pillars of sustainability: social, economic, environmental and governance aspects. The indicators need to be finalized in consultation with key stakeholders and I&APs.

Table 7.1: SEA Indicator Framework

<i><b>Environmental</b></i>	<i><b>Social</b></i>	<i><b>Economic</b></i>	<i><b>Governance</b></i>
Soil quality	Resident population density	Tourism figures (including tourism seasonality, accommodation coefficient and tourism amenities)	Clear policies
Waste production index	Unemployment rate		Management/ institutional structures with clear roles and responsibilities
Protected area index	Social amenities and services (schools, clinics, hospitals, etc.)	Construction coefficient	Budget/ resource allocation
Coastal protection index			
Beach quality	Infrastructural audit (roads, railway, airport infrastructure, electricity, water provision, etc.)	Land tenure patterns (land owned privately)	
Fresh water quality			
Air quality		Land use types and changes	
Energy consumption		Infrastructure index	
Vegetation cover			
Indicator/ focal species inventory			
Biodiversity types			

The study emphasizes the importance of incorporating a spatial approach to the development of a strategic framework to ensure ICZM in the area under study. A critical component is to develop an environmental information system that has the capability to integrate data required to sufficiently provide information on the indicators identified. The importance of spatial data particularly, is underscored and needs to be prioritized by relevant government Departments such as the GIS Unit in the Department of Land Affairs and Land and Surveying Departments at Provincial and Municipal levels. The relevant resources need to be invested for this to occur and it may be necessary for government Departments to develop partnerships with relevant research institutions such as universities and the CSIR. The gap in data impacts on our ability to understand changes in specific zones. For example, in this study remotely sensed images were only

available for 2000, 2001, 2002, 2003 and 2008. The data clearly reveals that the most significant changes occurred from 2003 to 2008. However, the actual years during this period when the changes occurred could not be ascertained. This limits our understanding of what has triggered the changes in specific localities.

In addition to the indicators proposed as the main component of the SEA Framework, the following aspects should also be integrated:

- The development of sustainability plans for sectoral organizations, especially the tourism and estate sectors
- The current EIA processes undertaken in relation to development projects in the area should be revised to consider adequately the incorporation of an overall SEA Framework, especially the strategic indicators identified to curtail or minimize the pressure on coastal ecosystems as a result of new activities
- The delineation of ‘no-go-zones’ to protect biodiversity hotspots and the promotion of the protection of the natural heritage in the area
- Collection of baseline information where and when needed
- Plans to rehabilitate environmentally degraded areas
- Plan to eradicate and manage invasive aliens in the area
- Consideration of greening corridors to facilitate the movement of species and maintain the integrity of key habitats

It is important to note the above should be undertaken in consultation with I&APs in the area to ensure buy-in and support. As Milligan *et al.* (2009: 206) state:

*It is becoming widely accepted that organizations involved in managing our coastal zones need to conduct more transparently the process of decision-making, and in much more participatory ways. Because of the complex governance arrangements for coastal management and the multitude of different stakeholders involved..., open and participatory decision-making processes are crucial if consensus and sustainable outcomes are to be reached.*

## 7.4 Recommendations

Throughout the analysis, suggestions to address problems have been integrated into the discussion. The key recommendation for effective ICZM in this study area has been to adopt an SEA approach and to this end a Framework, as well as key indicators have been articulated. Additionally the following specific recommendations are forwarded:

### 7.4.1 Institutional structures

Water catchment management for river systems is an important feature of the policy and environmental management landscape. It is imperative that institutional structures are put into place for ICZM as well.

The institutional structures are also needed to provide decision support for ICZM informed by a thorough SEA of the zone. As Sardá *et al.* (2005: 427) indicate and is cited in the literature review, the decision support system should be composed of three aspects which are revisited here in relation to the contribution of this study:

- the development of an environmental indicator-based report (strategic indicators for the north coast have been identified in this research endeavor);
- the use of GIS (this study highlights the importance of participatory mapping to incorporate stakeholder social, economic, political and environmental perceptions regarding the spatial contexts); and
- the incorporation of different types of graphical packages (not undertaken in this study but modeling can play an important role in tracking the indicators identified in the SEA Framework proposed as well as future scenario planning).

Similar to this study, Sardá *et al.* (2005) emphasize the importance of spatial attributes and considerations. However, they promote a largely technical and scientific approach while this study advocates for the adoption of a methodological and analytical approach that integrates social, economic, political and spatial aspects informed by stakeholder theory. Thus, a decision support system should include stakeholder perceptions as well as a critique of the policy and institutional environments as undertaken in this study. The

Royal Commission on Environmental Pollution (1998 cited in Milligan *et al.*, 2009: 206) states: “Scientific underpinning of any social discussion is vital, but is not in itself sufficient. Local opinion, knowledge of processes which reflect experience and careful observation, as well as all the important values of social judgment must all contribute to a ‘full scientific enquiry’ in the modern era”.

ICZM is necessary and doable as demonstrated by Sardá *et al.* (2005: 428) who show how ICZM informed by a well developed environmental information system was applied across 70 Municipalities to ensure the sustainable management of the Catalonian coastline (which is 699.3 km long) in Spain. The authors assert that the ICZM framework for the Catalonian coastline is part of a broader strategy to develop a National Strategy for ICZM in Spain. The National Strategy should also be a policy goal in the South African context as well.

#### **7.4.2 Tourism**

Tourism is one of the key drivers in the area. Both focus groups and tourist organization stakeholders concur that the prime socio-economic benefits (and drivers) of tourism is employment creation. Furthermore, they assert that tourism is an industry that has the ability to employ people across a range of skills and education levels, from highly to very lowly skilled. In addition, they agree that KwaZulu-Natal has the highest proportion of poor people and also the greatest potential for tourism. They also indicate that tourism and employment creation is strongly advocated by Government’s mandate for economic growth in South Africa. It is recommended that suitable forms of tourism be pursued, which takes the sustainability of natural environments into consideration. The literature indicates that when tourism and other activities compromise the natural environment, tourists will relocate to other areas. With the amount of infrastructure and commitment to skills development in the tourism sector, it cannot afford to pursue an unsustainable path. Stakeholders have overwhelmingly suggested that the most appropriate form of tourism for the area is ecotourism. There are interesting prospects for the inclusion of marine ecotourism for the area, and literature indicates that this is form of tourism is

growing phenomenally internationally. However, it needs careful planning. Literature also suggests the immense potential for education tourism linked with ecotourism, and education in ICZM is also highlighted. There are possibilities for links and potentials in these forms of tourism.

#### ***7.4.3 Climate change and policy development***

While not emerging as a major issue in this study, the literature clearly reveals that climate change will be a major issue to consider, especially in coastal areas. It is imperative that the SEA process as well as policy development considers the potential impacts of climate change and sea level rise on the north coast and begins to plan accordingly, with planned retreat and adaptive management strategies put in place for new development.

#### ***7.4.4 Key threats***

Building on the literature and findings of Goodman (2005) and Mucina *et al.* (2006 cited in Mucina and Rutherford, 2006), coastal resources in the study area are considered highly transformed and under-conserved. Furthermore, the increase in built infrastructure is compromising and compounding the ability of natural systems to produce free ecosystem goods and services. The most significant threats identified by the authors indicate that cultivation and afforestation, alien plant invasions and urban and industrial expansion are the most prominent. Several recommendations are forwarded in this respect, and include:

- a comprehensive and detailed spatial account of the types of alien plant (and other organisms) invasions, their likely impacts on the natural resource base (especially with regard to water consumption), threats to natural vegetation and comprehensive eradication methods and management. The stakeholder perceptions in the study indicates that management should include alien plant invasions on private properties.

- While cultivation and afforestation has social benefits, they impact largely on water sources, and alternate water sources need to be recommended and implemented. This could also be an area for future research.
- As indicated by respondents, urbanization and industrialization are the necessary consequences of development, however, they need be managed effectively in relation to environmental capacities if sustainable development of our coasts are to be realized.

#### **7.4.5 Future research**

It is important for existing research to inform advocacy for coastal zone protection and management, support partner capacity building given the range of stakeholders and affected parties in the area, and be linked to policy evaluation and development. Some of the areas identified for further research are:

- Need to understand the implications of development policies and programs including land tenure systems and economic aspiration on coastal areas in the short and long-term to be able to generate evidence-based analysis. As indicated in this research, currently the key policies are promoting economic development without due consideration to environmental consequences. Yet, the socio-economic data reveals that the majority of people living in the area (in rural traditional settings) remain impoverished and very little development positively impacts on their quality of life. On the other hand, vast tracts of land are being used for eco-estate and infrastructural development (such as the airport) that benefit the wealthier segments in society. A cost-benefit analysis should be undertaken to ascertain whether such significant amounts of natural heritage are being used in the best possible way or do they simply benefit the rich?
- Given the limitations of the policies in the data analysis, key policies need to be revised because they prove inadequate to raise issues pertinent to coastal areas. Furthermore, planning for policy is usually ignored. It is therefore recommended that policy analysis continues with a more detailed examination of policy and praxis, including identifying and addressing policy gaps. This study, for example,

underscores the importance of different government departments and policies aligning themselves with each other. However, what are the best policy mechanisms? Who should be the lead agencies? How should consultation and participation be meaningfully integrated into the policy development process given that most stakeholders in this study felt that public participation was used to legitimize decisions rather than truly consider stakeholder concerns and points of views?

- Issues of land security and tenure as they relate to power dynamics in the area need to be examined. There are two main land tenure systems functioning in the area: private owners and traditional tenure systems. This study reveals that private property owners in particular in the study location wield tremendous decision-making power. The extent and patterns of these types of land management systems need to be assessed in relation to the management of coastal ecosystems and how development decisions are made.
- Research needs to be undertaken to establish the extent to which natural resources in the area is being currently utilized, by whom and for what purposes. This study examined the general trends in relation to land use and cover changes. However, a more detailed examination of natural resource usage in the area is required to predict future impacts and locations of concern.
- Respondents suggested the pricing of biodiversity to effectively communicate the material value (as is in the language understood and most likely to positively influence) decision-making.
- Golf estates are emerging as the largest threat to the study area, in terms of them transcending multiple ecosystems, generating cumulative impacts and locating in highly sensitive areas. However, they do also hold, due to the location of their activities, the immense potential as targets for future management of the area. Where Municipalities lack the finance and capacities for effective biodiversity monitoring and compliance, estate owners have the capacity to be effectively included in management structures to preserve and protect biodiversity in the area. Eco-estates also hold great potential to enhance tourism in the area. Since,

- the perception towards them is largely negative, mechanisms need to be put into place to engage in active dialogues and partnerships with these property owners.
- The potential for retaining as much agricultural land for food security is another issue that requires future research. The study revealed that commercial sugarcane, for example, not only contributes to food security, but is also a primary sector employment generator in the area.

There is need for clearer reforms within institutions and businesses to adopt a strategic view to an ICZM approach in the area. It is imperative that independent research institutions and organisations including universities conduct research in the areas identified above. SEA is a policy intervention. Clearly, the analysis reveals that the policy analysis has to take into consideration the human footprint on this landscape. According to the literature reviewed, coastal areas are largely evolving into human coastal systems and appropriate intervention will thus need to target decision-making and management structures, rather than biodiversity.

## **7.5 Concluding remarks**

This study concludes that the key problem in relation to the nature of information required for coastal zone management lies not so much in the provision or the content of information itself, but in the way it is presented to those who formulate and implement policy and take management decisions. This study has also indicated that stakeholder input into decision-making is crucial, and can go a long way to either support or reject policy implementation and management in the area. The continuation of the current trajectory is likely to yield large amounts of conflict, which will eventually undermine sustainable development. A strategic perspective is therefore immediately required. Both the SEA Framework and the data collection employed in this study indicate the need for the timely monitoring and evaluation of trends, using indicators, in order to produce the right information at the right time. This is currently lacking in the development of this coastal landscape.

The multi-conceptual framework used in this study is in keeping with White *et al*'s (2009) approach that calls for an integrated conceptual framework to understand biodiversity issues, and conflicts in particular. They argue that this is important since concerns and contestations over the natural resource base are embedded in ecological, economic and social dynamics. They assert that often studies focus on one of these aspects which are inadequate. They also reinforce the importance of social scientific viewpoints. This study underscores the importance of an integrated approach and extends social science contributions to incorporate spatial dimensions.

The conceptual framework reveals that SEA focuses on policy and management, with little focus on the spatial and stakeholder perceptions which are often neglected. An assessment utilizing stakeholder perceptions was utilized in this study. It underscored the benefits of utilizing participatory GIS which was integrated in a way in which biophysical attributes are perceived by stakeholders. Furthermore, it makes crucial links between the three pillars of sustainability; social, economic and environmental. It also highlighted the political aspect (particularly in relation to governance and management issues), which is furthermore, a neglected aspect in sustainability. This study further presents relevant data for undertaking ICZM as well as an SEA. In this study, the identification of biodiversity 'hotspots' as well as no-go areas offers a mechanism for the mainstreaming of EIA into the long-term strategic objectives of this coastal landscape. Lastly, while SEA is a relatively well-established approach in the international arena (Europe and the United States), there are, to the best of the researcher's knowledge, no study in South Africa utilizing participatory mapping in the context of a stakeholder analysis has been used to undertake an assessment of coastal area management and develop an SEA Framework for the future planning and management of the coastal zone.

## REFERENCES

- Abaza, H., Bisset, R and Sadler, B. 2004: *Environmental Impact Assessment and Strategic Environmental Assessment: Towards an Integrated Approach* United Nations Environment Program (UNEP).
- ABSA, 2007: The South African coastal property market *Residential property perspective* 1-5.
- Abuodha, P.A. and Woodroffe, C.D. 2006: *International assessments of the vulnerability of the coastal zone to climate change, including the Australian perspective* Australian Greenhouse Office, Department of the Environment and Heritage.
- Adams, W.M. and Hutton, J. 2007: People, Parks and Poverty: Political Ecology and Biodiversity Conservation *Conservation and Society* 2, 147–183.
- Adger, W. N., Brown, K and Tompkins, E.L. 2005: The political economy of cross-scale networks in resource co-management. *Ecology and Society* 10 <http://www.ecologyandsociety.org/vol10/iss2/art9/>, Accessed 10 July 2007.
- Adger, W.N. 2000: Social and ecological resilience: are they related? *Progress in Human Geography* 24, 347–364.
- Adger, W.N., Benjaminsen, T.A., Brown, K. and Svarstad, H. 2001: Advancing a political ecology of global environmental discourses *Development and Change* 32, 681-715.
- Ahmed, A.K., 2006: *Concepts and practices of “resilience”*: A compilation from various secondary sources, paper prepared for the Coastal Community Resilience Program, US Indian Ocean Tsunami Warning System (IOTWS) Program. Bangkok.
- Ahmed, F. 2005: *The impacts of tourist and residential development on the KwaZulu-Natal north coast: Umhlanga Rocks to Salt Rock*. Unpublished Masters Thesis, University of KwaZulu-Natal Durban.
- Alshuwaikhat, H.M. 2005: Strategic environmental assessment can help solve environmental impact assessment failures in developing countries *Environmental Impact Assessment Review* 25, 307–317.
- Anker, H.T., Nellemann, V. and Sverdrup-Jensen, S. 2004: Coastal zone management in Denmark: ways and means for further integration *Ocean & Coastal Management* 47, 495–513.

Antrop, M. 2001: The language of landscape ecologists and planners: A comparative content analysis of concepts used in landscape ecology *Landscape and Urban Planning* 55, 163-173.

Atkinson, D. 2002: “*A passion to govern*”: *Third-generation issues facing local government in South Africa* Centre for Development and Enterprise, South Africa.

Australian South Africa Local Governance Partnership, 2002: Australia South Africa local government partnership, Inception report: Annexure A, 15 May 2002.

Ayad, Y.M. 2005: Remote sensing and GIS in modeling visual landscape change: A case study of the northwestern arid coast of Egypt *Landscape and Urban Planning* 73, 307-325.

Bagstad, K.J., Stapleton, K. And D'Agostino, J.R. 2007: Taxes, subsidies, and insurance as drivers of United States coastal development *Ecological Economics* 63, 285-298.

Banica, A., Bastard, J. and Kosiek, M. 2003: *Integrated Coastal Zone Management (ICZM): a framework to tackle environmental issues? Danish Approach*. Published Thesis, Centre for Environmental Studies, The University of Aarhus., Denmark.

Barbados Program of Action, 1994: *Report of the global conference on the sustainable development of small island developing states*. UN General Assembly. Bridgetown. Barbados.

Bartlett, R. V. 1997: The rationality and logic of NEPA revisited. In *Environmental Policy and NEPA: past, present and future* (Eds, Clark, R. and Canter, L.) St.Lucie. Press, Boca Raton.

Belisle, M. 2005: Measuring landscape connectivity: the challenge of Behavioral Landscape Ecology, *Ecology* 86, 1988-1995

Bennett, R.G. 2001: Future perspectives on integrated coastal zone management, Arbeider fra Institutt for geografi, Bergen.

Berkes, F. 2004: Rethinking community-based conservation *Conservation Biology* 18, 621-630.

Billé, R. 2007: A dual-level framework for evaluating integrated coastal management beyond labels, *Ocean and Coastal Management*, 50, 796-807.

Bille, R.L. and Mermet, L. 2002: Policy and practice: Sectoralization of an Integrated Coastal Management Program: A Case Study in Madagascar *Journal of Environmental Planning and Management* 45, 913–926.

Blaschke, T. 2006: The role of the spatial dimension within the framework of sustainable landscapes and natural capital, *Landscape and Urban Planning* 75, 198–226.

Bojorquez-Tapia, L.A., Diaz-Mondragon, S. and Ezcurra, E. 2001: GIS-based approach for participatory decision-making and land suitability assessment *International Journal of Geographical Information Science* 15, 129-151.

Borghi, J.; Shrestha, D.L.; Shrestha, D. and Jan, S. 2007: Using focus groups to develop contingent valuation scenarios – A case study of women’s groups in rural Nepal *Social Science and Medicine* 64: 531-542.

Boulding, K.E. 2004: General systems theory: The skeleton of science *ECO* 6, 127-139.

Bowen, R.E. and Riley, C. 2003: Socio-economic indicators and integrated coastal management, *Ocean & Coastal Management* 46, 299–312.

Bower, B.T and Turner, K. 1998: Characterizing and analyzing benefits from integrated coastal management (ICM) *Ocean & Coastal Management* 38, 41-66.

Brass, K. 2007: *Golf rush moves beyond America and Europe*, International Herald Tribune, 12 April 2007.

Brody, S.D., Godschalk, D.R. and Burby, R.J. 2003: Mandating Citizen Participation in Plan Making: Six Strategic Planning Choices, *Journal of the American Planning Association* <http://www.informaworld.com/smpp/title~content=t782043358>, Accessed: 12 May, 2009.

Brown, A.L. and Therival, R. 2000: Principles to guide the development of strategic environmental assessment methodology *Impact Assessment and Project Appraisal* 18, 183-189.

Brown, J.C. and Purcell, M. 2005: There’s nothing inherent about scale: Political ecology, the local trap, and the politics of development in the Brazilian Amazon *Geoforum* 36: 607-624.

Brown, K. 2002: Innovations for conservation and development *The Geographical Journal* 168, 6-17.

Brown, K., Tompkins, E. and Adger, W.N. 2001: *Trade-off Analysis for Participatory Coastal Zone Decision-Making*, Overseas Development Group, University of East Anglia.  
Brownlie, S and Wynberg, R. 2001: *The Integration of Biodiversity into National Environmental Assessment Procedures: National Case Studies*, Biodiversity Planning Support Programme UNDP/UNEP/GEF.

Brownlie, S and Wynberg, R. 2001: The Integration of Biodiversity into National Environmental Assessment Procedures: National Case Studies from South Africa, Report prepared for the Biodiversity Planning Support Programme, UNDP/UNEP/GEF.

Brownlie, S., Walmsley, B. and Tarr, P. 2006: *Guidance document on biodiversity, impact assessment and decision making in Southern Africa* IAIA Capacity Building in Biodiversity and Impact Assessment projects.

Bryman A. 2004: *Social Research Methods* (2nd Edition). Oxford University Press, Oxford.

Burak, S., Dogan, E. and Gazioglu, C. 2004: Impact of urbanization and tourism on coastal environment *Ocean & Coastal Management* 47, 515–527.

Burke, L.A., Kura, Y., Kassem, K., Revenga, C., Spalding, M. and McCallister, D. 2001: *Coastal Ecosystems*. World Resources Institute. Washington, DC

Camp, K. 1999: *The Bioresource Groups of KwaZulu-Natal: Coast and Hinterland*, Cedara Report No N/A/99/12.

Cave, P. 2003: *Sports tourism: The case for a local approach in Africa* Second African conference on peace through tourism, Dar es Salaam, Tanzania.

Celliers, L. and MacKay, F. 2005: Coastline for sale The real coast? *African Wildlife* 59 <http://www.wessa.org.za/publicationsAWLcoastline.asp>. Accessed: 14 October 2006

Celliers, L., Bulman, R., Breetzke, T. and Parak, O. 2007: Institutional Mapping of Integrated Coastal Zone Management in KwaZulu-Natal *South Africa Ocean Yearbook* 21: 365-403.

Chapin, F.S., Zavaleta, E.S., Eviner, V.T., Naylor, R.L., Vitousek, P.M., Reynolds, H.L., Hooper, D.U., Lavorel, S., Sala, O.E., Hobbie, S.E., Mack, M.C. and Diaz, S. 2000: Consequences of changing biodiversity, *Nature* 405, 234-242.

Chia, L.S. 2000: Overview of Impact of Sewage on the Marine Environment of East Asia: Social and Economic Opportunities. EAS/RCU Technical Report Series No. 15

Christie, P, Lowry, K., White, A.T., Oracion, E.G., Sievanen, L., Pomeroy, R.S., Pollnac, R.B., Patlis, J.M. and Eisma, R.V. 2005: Key findings from a multidisciplinary examination of integrated coastal management process sustainability, *Ocean and Coastal Management* 48, 468–483.

Christie, P. 2005: Is integrated coastal management sustainable? *Ocean and Coastal Management* 48, 208-232.

Cicin-Sain B and Knecht R. 1998: *Integrated coastal and ocean management: Concepts and practices* Washington, DC: Island Press.

Cicin-Sain, B., Knecht, R.W., Vallega, A. and Harakunarak, A. 2000: Education and training in integrated coastal management: lessons from the international arena, *Ocean and Coastal Management* 43, 291–330.

City of uMhlathuze, 2008: *Local Economic Development Strategy 2008 – 2011* uMhlathuze Municipality.

Connick, S and Innes, J. 2001: *Outcomes of Collaborative Water Policy Making: Applying Complexity Thinking to Evaluation*, Working Paper 2001-08 University of California at Berkeley, Institute of Urban and Regional Development.

Convention on Biological Diversity, 2000: Ecosystem Approach, COP5 Decision V/6.

Conway, T.M. 2005: Current and future patterns of land-use change in the coastal zone of New Jersey *Environment and Planning B: Planning and Design* 32, 877-893.

Cooper, A. 2009: Coasts in crisis. Presentation made at the University of KwaZulu-Natal.

Cooper, S. 2007: The Impact of Holiday Homes on the Environment and Social Capacity of Kapparis, Cyprus, Unpublished Honors thesis.

Costanza, R. and Farley, J. 2007: Ecological economics of coastal disasters: Introduction to the special issue, *Ecological Economics* 63, 249-253.

Council for Scientific and Industrial Research, 2001: *Standardized South African land use/cover classification system and associated description*. CSIR, Pretoria.

Creel, L. 2003: *Ripple effects: population and coastal regions* Population Reference Bureau.

Crossland CJ, Kremer H.H, Lindeboom H.J, Crossland J.I, and Le Tissier MDA (Eds.), 2005: *Coastal Fluxes in the Anthropocene*. Springer-Verlag, Berlin, Heidelberg.

Curran, S., Kumar, A., Lutz, W. and Williams, M. 2002: Interactions between Coastal and Marine Ecosystems and Human Population Systems: Perspectives on How Consumption Mediates this Interaction, *Ambio* 31, 264-268.

DAEA, 2004: *Draft KwaZulu – Natal Coastal Management Policy*. Provincial Gazette of KwaZulu – Natal No.11.

DAEA, 2007: Business plan for the KwaZulu-Natal coastal erosion crisis project, Department of Agriculture and Environmental Affairs.

Dalal-Clayton, B. and Sadler, B. 1998: Strategic environmental assessment: a rapidly evolving approach, International Institute for Environment and Development. Environment Planning Issues No. 18.

Dalkman, H., Herrera, R.J. and Bongardt, D. 2004: Analytical strategic environmental assessment (ANSEA) developing a new approach to SEA, *Environmental Impact Assessment Review* 24, 385-402.

Davenport, J. and Davenport, J.L. 2006: The impact of tourism and personal leisure transport on coastal environments: A review, *Estuaries Coastal and Shelf Science* 67, 280-292.

de Villiers, C., Brownlie, S. and Manuel, J. 2008: *Biodiversity mainstreaming and EIA: Art, science or myth?* International Association for Impact Assessment, Conference Proceedings

DEAT, 1998: *National Environmental Management Act (107 of 1998)*. Government Gazette 19519 of 27 November 1998. Government Printer, Pretoria.

DEAT, 2000a: *The White Paper for Sustainable Coastal Development in South Africa*. Government Printer, Pretoria.

DEAT, 2000b: *Strategic Environmental Assessment in South Africa*, Guideline Document. Government Printer, Pretoria.

DEAT, 2004: *Overview of Integrated Environmental Management, Integrated Environmental Management, Information Series 0*, Department of Environmental Affairs and Tourism (DEAT), Pretoria.

DEAT, 2006a: South African Environment Outlook: A report on the *state of the environment report*, Chapter 7, Department of Environmental Affairs and Tourism, Pretoria.

DEAT, 2006b: Addressing the mainstreaming of the environment into development: issues and opportunities relating to AsgiSA (Accelerated and Shared Growth Initiative South Africa), Report recommendations from the National Environmental Advisory Forum workshop.

[http://www.deat.gov.za/Branches/COO/neaf\\_2005/Documents/FINAL%20NEAF%20ASGISA%20%20Workshop%20%203%20Oct%202006%203.doc.pdf](http://www.deat.gov.za/Branches/COO/neaf_2005/Documents/FINAL%20NEAF%20ASGISA%20%20Workshop%20%203%20Oct%202006%203.doc.pdf), Accessed, 12 May 2009.

DEAT, 2006c: The integrated coastal management Bill: A brief guide to assist the public participation process, Department of Environmental Affairs and Tourism.

DEAT, 2006d: Presentation on revised National Environmental Management Act: Environmental Impact Assessment Regulations, April 2006.

DEAT, 2007: Integrated coastal management Bill. Presentation, 20 November.

DEAT, 2008: *National Environmental Management: Integrated Coastal Management Act*, No. 24 of 2008, South Africa. Cape Town.

Degnbol, P., Wilson, D.C., Grolin, H.A. and Jensen, S.S. 2003: *Spatial Scale in Coastal Zone Management: Current Approaches, Challenges and Possibilities*. Institute for Fisheries Management and Coastal Community Development Denmark. Paper presented at Rights and Duties in the Coastal Zone, Stockholm, Sweden.

Denzin, N.K. and Lincoln, Y.S. 1994: *Handbook of Qualitative Research* Sage Publishers: London.

Dumont, E., Harrison, J.A., Kroeze, C., Bakker, E.J. and Seitzinger, S.P. 2005: Global distribution and sources of dissolved inorganic nitrogen export to the coastal zone: Results from a spatially explicit, global model *Global Biogeochemical Cycles* 9, GB4S02, doi: 10.1029/2005GB002488.

Dusik, J., Sadler, B. and Mikulic, N. (2001) Developments in strategic environmental assessment in Central and Eastern Europe, in Dusik, J. (Ed.) *Implementing Strategic Environmental Assessment* Berlin, Springer.

DWAF: 2008: *Water reconciliation strategy study for the KwaZulu-Natal coastal metropolitan areas*, Minutes of Steering Committee Meeting, Directorate: National Water Resource Planning (NWRP).

Erdas, 2004. Erdas Imagine 8.7, Leica Geosystems GIS & Mapping., Atlanta , GA, USA

Escobar, A. 2001: Culture sits in places: Reflections on globalism and subaltern strategies of localization, *Political Geography* 20, 139-174.

eThekweni Municipality. 2007: Integrated Development Plan: 5 Year Plan: 2006/07 to 2010/11, 2009/2010 Annual Review.

Exclusive Properties ZA, 2009: Investing in South Africa, <http://www.exclusivepropertiesza.com>, Accessed 5 August 2009.

Fairbanks, D.H.K. and Benn, G.A 2000: Identifying regional landscapes for conservation planning: A case study from KwaZulu-Natal, South Africa *Landscape and Urban Planning* 50, 237-257.

Fassnacht, K.S., Cohen, W.B. and Spies, T.A. 2005: Key issues in making and using satellite-based maps in ecology: a premier, *Forest Ecology and Management*, [www.elsevier.com/locate/foreco](http://www.elsevier.com/locate/foreco), Accessed, 20 July 2007.

Fennell, D. 2003: *Ecotourism: An introduction*, 2<sup>nd</sup> edition. Routledge, London.

Fereday, J. and Muir-Cochrane, E. 2006: Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development, *International Journal of Qualitative Methods* 5, 1-11.

Ferguson, C. 2007: *Ohlanga-Tongati Local Area Plan and Coastal Management Plan* Final Report eThekweni Municipality.

Fischer, T.B., Wood, C. and Jones, C. 2002: Policy, plan, and program environmental assessment in England, the Netherlands, and Germany: practice and prospects *Environment and Planning* 29, 159-172.

Foley, J.A., DeFries, R., Asner, G.P., Barford, C., Bonan, G., Carpenter, S.R., Chapin, F.S., Coe, M.T., Daily, G.C., Gibbs, H.K., Helkowski, J.H., Holloway, T., Howard, E.A., Kucharik, C.J., Monfreda, C., Patz, J.A., Prentice, C., Ramankutty, N. and Snyder, P.K. 2005: Global Consequences of Land Use, *Science* 309, 570-574.

Folke, C.S., Carpenter, T., L. Elmqvist, Gunderson, C., Holling, S. and Walker, B. 2002: Resilience and sustainable development: Building adaptive capacity in a world of transformations, *Ambio* 31, 437- 440.

Food and Agricultural Organization, 2009: The state of the world fisheries and aquaculture 2008, FAO Fisheries and Aquaculture Department. United Nations, Rome.

Forsyth, T. 2008: Political ecology and the epistemology of social justice, *Geoforum* 39, 756-764.

Francis, J. and Torell, E. 2004: Human dimensions of coastal management in the Western Indian Ocean region, *Ocean and Coastal Management* 47, 299–307.

Freedman, W. 2006: *On the beach: Ownership and access to the sea and the sea shore in South Africa*. Unpublished report, University of KwaZulu-Natal, South Africa.

Fry, G., Tveit, M.S., Ode, A. and Velarde, M.D. 2009: The ecology of visual landscapes: Exploring the conceptual common ground of visual and ecological landscape indicators, *Ecological indicators* 9, 933-947.

Galaz, V., Moberg, F., Downing, T.E., Thomalla, F. and Warner, K. 2008: *Ecosystems under pressure, Commission on climate change and development* Stockholm, Sweden.

Garrod, B. and Wilson, J.C. 2004 Nature on the edge? Marine ecotourism in peripheral coastal areas, *Journal of Sustainable Tourism* 12, 95-120.

Gattuso, J. and Smith, S.V. 2007: Coastal zone. In Cleveland, C.J. (Eds): *Encyclopedia of Earth* Washington, D.C. Environmental Information Coalition, National Council for Science and the Environment.

- Gebreslasie, M. 2009: Personal communication. 20 August.
- Gerber, E.R. and Phillips, J.H. 2004; Direct Democracy and Land Use Policy: Exchanging Public Goods for Development Rights, *Urban Studies* 41, 463-479.
- GESAMP (IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection. 1996: *The contributions of science to integrated coastal management*. GESAMP Reports and Studies No. 61.
- Glavovic, B. 2000: *Our Coast, Our Future: A New Approach to Coastal Management in South Africa*. Common Ground Consulting, South Africa.
- Glavovic, B.C. 2006a: The evolution of coastal management in South Africa: Why blood is thicker than water, *Ocean and Coastal Management* 49, 889–904.
- Glavovic, B.C. 2006b: Perceptions of South Africa's coastal policy formulation process. *Journal of Coastal Research*, SI 39 (Proceedings of the 8th International Coastal Symposium), 920- 924. Itajaí, SC, Brazil, ISSN 0749-0208.
- Glavovic, B.C. and Boonzaier, S. 2007: Confronting coastal poverty: Building sustainable coastal livelihoods in South Africa, *Ocean and Coastal Management* 50, 1–23.
- Goeldner, C.R. and Ritchie, J.R.B. 2006: *Tourism: Principles, practices and philosophies*, 10<sup>th</sup> edition. John Wiley & Sons, New Jersey, United States.
- Gontier, M. 2005: Biodiversity in environmental assessment-tools for impact prediction. KTH Land and water resources engineers, Stockholm.
- Gontier, M., Balfors, B. and Mortberg, U. 2006: Biodiversity in environmental assessment—current practice and tools for prediction, *Environmental Impact Assessment Review* 26, 268– 286.
- Goodman, P. 2005: *How Much Can We Afford to Lose?*, presentation to KwaZulu-Natal Provincial Coastal Committee.
- Gossling, S., Hansson, C.B., Horstmeier, O. and Saggel, S. 2002: Ecological footprint analysis as a tool to assess tourism sustainability, *Ecological Economics* 43, 199-211.
- Govender, D. 2004: *Coastal Management in Ilembe-South Africa*, ISOcaRP Congress, 1-10.
- Graham Muller Associates, 2006: *KwaZulu-Natal Provincial Economic Review 2005*, Conducted for the KwaZulu-Natal Department of Economic Development, KwaZulu-Natal.

Greenfacts. 2005: Scientific facts on ecosystem change. <http://www.greenfacts.org/>, accessed 24 March 2008.

Gremmenas, A. 2005: *A study on the degree of application of strategic environmental assessment (SEA) and integrated coastal zone management (ICZM) for the promotion of sustainable coastal development in Greece*, Unpublished Masters Thesis, University of East Anglia.

Grimm, N.B., Foster, D., Groffman, P., Grove, J.M., Hopkinson, C.S., Nadelhoffer, K.J., Pataki, D.E and Peters, D.P.C. 2008: The changing landscape: Ecosystem responses to urbanization and pollution across climatic and societal gradients, *Frontiers in Ecology* 6, 264–272.

Gulinck, H., Mugica, M., de Lucio, J.V. and Atauri, J.A. 2001: A framework for comparative landscape analysis and evaluation based on land cover data, with an application in the Madrid region (Spain). *Landscape and Urban Planning*, 55, 257–270.

Haag, F., 2002: *A remote sensing based approach to environmental security studies in the coastal zone: A study from Eastern Pondoland, South Africa*, Licentiate Thesis.

Hale, L., Meltzer, E and Ngoile, M. 1998: *Application of international experience to formulation of a National policy for coastal management for the Republic of South Africa. In lessons learnt from past experience*. Coastal Management Policy Program, Cape Town.

Hamadziripi, C. and Sishi, E. 2008: A snapshot of the KwaZulu-Natal economic growth and unemployment trends (2000-2007).

Hansom, J.D. 2001: Coastal sensitivity to environmental change: A view from the beach, *Catena* 42, 291–305.

Harriott, V.J. 2002: *Marine tourism impacts and their management on the Great Barrier Reef*. CRC Reef Research Centre Technical Report No 46. CRC Reef, Research Center, Townsville.

Hatcher, B. 1999: *Open space planning: A case study of the Natal north coast margin*, Unpublished Masters Thesis, University of Natal, Durban, South Africa.

Hawkins, V. and Selman, P. 2002: Landscape scale planning: Exploring alternative land use scenarios, *Landscape and Urban Planning* 60, 211-224.

Hedlund, E. and Mikkelsen, L. 2004: European Commission puts spotlight on coastal erosion, <http://europa.eu.int/comm/environment/iczm/home.htm>. Accessed 2 May 2007.

Heller, P. 2001: Moving the State: The Politics of Democratic Decentralization in Kerala, South Africa, and Porto Alegre. *Politics and Society* 29, 2001 131-163.

Hines, C.J.H. and G.R. Nichols, G.R. undated: *Landcover and vegetation study of the Dube Trade Port*, Pietermaritzburg.

Hobbs, R. 1997: Future landscapes and the future of landscape ecology, *Landscape and Urban Planning* 37, 1-9.

Hoegh-Guldberg, O., Mumby, P.J., Hooten, A.J., Steneck, R.S., Greenfield, P., Gomez, E., Harvell, C.D., Sale, P.F., Edwards, A.J., Caldeira, K., Knowlton, N., Eakin, C.M., Iglesias-Prieto, R., Muthiga, N., Bradbury, R.H., Dubi, A. and Hatziolos, M.E. 2007: Coral reefs under rapid climate change and ocean acidification *Science*, 318, 1737-1742.

Institute for Natural Resources (INR) 2007: *The Planning Initiative: Specialist Spatial Planning Report*, Dube Trade Port Environmental Impact Assessment, Musgrave.

Integrated coastal zone management in the Mediterranean, 2008: ICZM, from local to regional, how to stop the loss of biodiversity? Workshop Report, Nice, France.

Intergovernmental Panel on Climate Change, 2007: Climate Change Synthesis Report: Summary for Policymakers. Cambridge University Press, Cambridge, UK

Isager, L. 2008: Coastal zone management in developing countries with Kenya as a particular example, Final Report.

Island Resources Foundation, 1996: Guidance for Best Management Practices for Caribbean Coastal Tourism. Study for the United Nations Environment Program, Caribbean Environment Program and Regional Coordinating Unit. Kingston, Jamaica.

IUCN, 2007: Natural ecosystems as coastal development infrastructure, *The World Conservation Union*, 5, <http://iucn.org/coastalinfo/>, Accessed 4 July 2008.

Jarosz, L. 2004: Political ecology as ethical practice, *Political Geography* 23: 917-927.

Jinn, J., Wang, Z., Ran, S. and Yun, C. 2003: Study on coastal resource evaluation theories and methods, International Conference on Estuaries and Coasts. Hangzhou, China.

Jones, J.L. 2006: *Who benefits from 'conservation and development'? The political ecology of biodiversity in KwaZulu-Natal, South Africa*, Center for Environmental Studies, University of Pretoria, South Africa.

Jones, T.L. 1994: *Natal North Coast: investigation into land use, levels and rates of development, and remaining open space areas*, Prepared for the KwaZulu-Natal Town and Regional Planning Commission by the African Planning Partnership, Durban.

Jorge, M.R., Lourenço, N., Machado, C.R. and Rodrigues, L. 2002: Measuring, monitoring and managing sustainability in Indian coastal areas: the socioeconomic dimension, *Littoral* 22-26 September. Porto, Portugal.

Kammler, M and Schernewski, G. 2004: Spatial and temporal analysis of beach tourism using webcam and aerial photographs, In Schernewski and N. Löser (eds.), 2004: *Managing the Baltic Sea Coastline Reports 2*, Germany.

King, S.D. and Green, D.R. 2001: Redefining the limits of the coastal zone: bridging the gap between land and sea using remote sensing, GIS, and the internet, *GeoCoas* 2, 1-15.

Kitchin, R. and Tate, N.J. 2000: *Conducting Research in Human Geography* Pearson Education Limited: England.

Kitsiou, D., Coccossis, H. and Karydis, M. 2002: Multi-dimensional evaluation and ranking of coastal areas using GIS and multiple criteria choice methods, *Science of the Total Environment* 284, 1-7.

Klemas, V.V. 2001: Remote Sensing of Landscape-Level Coastal Environmental Indicators, *Environmental Management* 27, 47–57.

Komar, P.D. 2000: Coastal Erosion - Underlying Factors and Human Impacts, *Shore and Beach* 68, 3-16.

Kreuger, R.A. 1988: *Focus Groups: A Practical Guide for Applied Research* London: Sage.

Krueger, R.A., Casey, M.A., Donner, J., Kirsch, S. and Maack, J.N. 2001: *Social Analysis: Selected Tools and Techniques*, Social Development Papers of the World Bank, Paper Number 36.

Kuntonen-van't Riet. J. 2007: *Strategic Review of the Status of Biodiversity Management in the South African Mining Industry*, South African Mining and Biodiversity Forum, Chamber of Mines of South Africa and the World Conservation Union (IUCN) South African Office.

Kuvan, Y. 2005: The use of forests for the purpose of tourism: the case of Belek Tourism Center in Turkey, *Journal of Environmental Management* 75, 263–274.

Kuyler, P. 2006: *Application of multi-criteria analysis in land use decisions*, Submitted in accordance with the requirements for the degree of Doctor of Philosophy, Centre for Environmental Management, University of the Free State, Bloemfontein.

KwaDukuza Coastal Management, 2008: *Towards A coastal management plan for KwaDukuza Sustainable Development Projects*.

KwaDukuza Municipality, 2007: *Integrated Development Plan 2007/8 – 2010/12 Draft* KwaDukuza Municipality.

Laderchi, C.R. 2001: Participatory methods in the analysis of poverty: a critical review, QEH Working Paper Series, Working Paper Number 62.

Laine, A. and Kronholm, M. 2005: Bothnian Bay life: Towards Integrated Coastal Management, *Environmental Science and Policy* 8, 259-262.

Lawrence, D.P. 2000: Planning theories and environmental impact assessment, *Environmental Impact Assessment Review* 20, 607-625.

Lester, F.K. 2005: On the theoretical, conceptual, and philosophical foundation for research in mathematics education, *Analyses* 37 (6), 457-467.

Lewis, D.J. and Plantinga, A.J. 2005: Policies to Reduce Habitat Fragmentation: Combining Econometric Models with GIS-Based Landscape Simulations, Draft, Submitted to *JEEM*, 8-23-05.

Li, B. 2000: Why is the holistic approach becoming so important in landscape ecology? *Landscape and Urban Planning* 50, 27-41.

Li, H. and Wu, J. 2004: Use and misuse of landscape indices, *Landscape Ecology* 19, 389-399.

Lianyong, W. and Eagles, P.F.J. 2009: Some theoretical considerations: From landscape ecology to waterscape ecology, *Acta Ecologica Sinica* 29, 176-181.

Liding, C., Yang, Y., Yihe, L., Xiaoming, F. and Bojie, F. 2008: Pattern analysis in landscape ecology: Progress, challenges and outlook, *Acta Ecologica Sinica* 28, 5521-5531.

Liu, J., Zhan, J. and Deng, X. 2005: Spatio-temporal Patterns and Driving Forces of Urban Land Expansion in China during the Economic Reform Era, *Ambio* 34, 450-455.

LOICZ, 2005: Science Plan and Implementation Strategy. IGBP Report 51/IHDP Report 18. IGBP Secretariat, Stockholm.

Lombard, A.T., Strauss, T., Harris, J., Sink, K., Attwood, C. and Hutchings, L. 2004: *South African National Spatial Biodiversity Assessment 2004: Technical Report. Volume 4: Marine Component*. Pretoria: South African National Biodiversity Institute.

Lourenço, N. and Machado, C.R. 2007: Understanding Territory Dynamics in Coastal Areas: A methodological approach to analyze socio-economic and biophysical interactions. ENCORA, 1st Thematic Network Conference, 12th – 13th March 2007. Venice, Italy.

Luck, M. 2003: Education on marine mammal tours as agent for conservation—but do tourists want to be educated? *Ocean and Coastal Management* 46, 943–956.

Lutsch, W. 2008: Presentation on the National Biodiversity Strategy and Action Plan in South Africa.

Luz, F. 2000: Participatory landscape ecology – a basis for acceptance and implementation, *Landscape and Urban planning* 50, 157-166.

Macdonald, L.H., Anderson, D.A and Dietrich, W.E. 1997: Paradise Threatened: Land Use and Erosion on St. John, US Virgin Islands, *Environmental Management* 21, 851–863.

Maharaj, B., Pillay, V and Sucheran, R. 2008: Durban - A subtropical coastal paradise? Tourism dynamics in a post-apartheid city, <http://etudescaribeennes.revues.org/document1192.html>, accessed 3 March 2008.

Markwick, M.C. 2000: Golf tourism development, stakeholders, differing discourses and alternative agendas: the case of Malta, *Tourism Management* 21, 515-524.

Marsland, N., Wilson, I., Abeyasekera, S. and Kleih, U. 2001: *Combining quantitative (formal) and qualitative (informal) survey methods*, Socioeconomic Methodologies for Natural Resources Research. Best Practice Guidelines. Chatham, UK: Natural Resources Institute.

Martinez, M.L., Intralawan, A., Vazquez, G., Perez-Maqueo, O., Sutton, P. and Landgrave, R. 2007: The coasts of our world: Ecological, economic and social importance, *Ecological Economics* 63, 254-272.

Mauro, S. E. 2009: Seeing the local in the global: Political ecologies, world-systems, and the question of scale, *Geoforum* 40, 116-125.

McCarthy, J. 2002: First World political ecology: lessons from the Wise Use movement,

McCreary, S., Gamman, J., Brooks, B., Whitman, L., Bryson, R., McInerny, A., Fuller, B. and Glazer, R. 2001: Applying a Mediated Negotiation Framework to Integrated Coastal Zone Management, *Coastal Management Journal* 29, 183-216.

McGlashan, D.J. 2003: Funding in Integrated Coastal Zone Management partnerships, *Marine Pollution Bulletin*, 46, 393-396.

McKenna, J. and Cooper, A. 2006: Sacred cows in coastal management: the need for a 'cheap and transitory' model, *Area* 38.4, 421–431.

Mclean, R.F. and Tsyban, A. 2001: Coastal Zones and Marine Ecosystems, in McCarthy, J.J., Canziani, O.F., Leary, N.A., Dokken, D.J. and White, K.S. 2001: *Climate change 2001: Impacts, Adaptation, and Vulnerability* Cambridge University Press, United Kingdom.

Mercadie, A. 1999: Assessment of the impact of the future SEA Directive on Integrated Coastal Zone Management, Université du Littoral, Dunkerque, France.

Millennium Ecosystem Assessment, 2003: *Ecosystems and human well-being* Island Press, Washington, D.C., USA.

Milligan, J., O’Riordan, T., Nicholson-Cole, S.A. and Watkinson, A.R. 2009: Nature conservation for future sustainable shorelines: Lessons from seeking to involve the public, *Land Use Policy* 26, 203–213.

Ministry of the Environment Government of Japan, 2003: Effective SEA system and case studies, Mitsubishi Research Institute, INC of Japan

Moffat, T. and Finnis, E. 2005: Considering social and material resources: The political ecology of a peri-urban squatter community in Nepal, *Habitat International* 29: 453-468.

Morrison-Saunders, A. and Fischer, T.B. 2006: What is wrong with EIA and SEA anyway? A skeptic’s perspective on sustainability assessment, *Journal of Environmental Assessment Policy and Management* 8, 19–39.

Mucina, L., Scott-Shaw, C.R., Rutherford, M.C., Camp, K.G.T., Matthews, W.S., Powrie, L.W. and Hoare, D.B. 2006, in Mucina, L. and Rutherford, M.C. (eds) 2006: *The vegetation of South Africa, Lesotho and Swaziland*. Strelitzia19. South African National Biodiversity Institute, Pretoria.

Muldavin, J. 2008: The time and place of political ecology: An introduction to the articles honoring the life-work of Piers Blaikie, *Geoforum* 39, 687-697.

Musacchio, L., Ozdenerol, E., Bryant, M. and Evans, T. 2005: Changing landscapes, changing disciplines: seeking to understand interdisciplinarity in landscape ecological change research, *Landscape and Urban Planning* 73, 326-338.

Nagendra, H. 2001: Using remote sensing to assess biodiversity, *Remote Sensing* 22, 2377–2400.

Najam, A., Runnalls, D. and Halle, M. 2007: *Environment and Globalization: Five Propositions*, International Institute for Sustainable Development. Winnipeg, Canada.

National Spatial Development Perspective (NSDP), 2003: *Spatial Guidelines for Infrastructure Investment and Development (SGIID)* Policy Co-ordination and Advisory Services.

Naveh, Z. 2000: What is holistic landscape ecology? A conceptual introduction, *Landscape and Urban Planning* 50, 7-26.

Neale, D. 2003: *The Urban Sea and Coastal Zone Management*, New Professional Tasks – Marine Cadastres and Coastal Management, FIG Working Week 2003, Paris, France.

Nel, V. 2009: *Can the South African Land use management system be an effective tool in creating lower carbon cities?* Land use management and lower carbon emissions. 45th ISOCARP Congress 2009

Nelson, G.C., Bennett, E., Berhe, A.A., Cassman, K., DeFries, R., Dietz, T., Dobermann, A., Dobson, A., Janetos, M., Levy, D., Marco, N., Nakicenovic, B., O'Neill, R., Norgaard, G., Petschel-Held, D., Ojima, P., Watson, R and Zurek, M. 2006: Anthropogenic Drivers of Ecosystem Change, *Ecology and Society* 11, <http://www.ecologyandsociety.org/vol11/iss2/art29/>. Accessed 20 July 2008.

Neumann, R.P. 2008: Probing the (in)compatibilities of social theory and policy relevance in Piers Blaikie's political ecology, *Geoforum* 39, 728-735.

Nijkamp, P. and Vandigni, G. 2000. A Multi-Dimensional Comparative Assessment Methodology for Policy Analysis: A Multi-Country Study of the Agricultural Sector, *Journal of Environmental Systems*, 8: 1-17.

Noronha, L. 2004: Coastal management policy: observations from an Indian case, *Ocean and Coastal Management* 47, 63-77.

Noronha, L., Lourenco, N., Lobo-Ferreira, J.P., Lleopart, A., Feoli, E., Sawkar, K. and Chachadi, A. (Eds) 2002: *Coastal tourism, environment, and sustainable local development*. Teri. New Delhi, India.

North West Provincial Government, 2004: *Rustenberg Strategic Environmental Assessment*, North West Environmental Management Series 2, Mafikeng, South Africa.

Nunneri, C., Turner, R.K., Cieslak, A., Kannen, A., Klein, R.J.T., Ledoux, L., Marquenie, J.M., Mee, L.D., Moncheva, S., Nicholls, R.J., Salomons, W., Sardá, R., Stive, M.J.F. and Vellinga, T. 2004: Group report: integrated assessment and future scenarios for the coast, In Vermaat *et al.* 2004: *Managing European coasts: Past, present and future*, Springer Verlag.

O'Brien, K.L. and Leichenko, R.M. 2000: Double exposure: assessing the impacts of climate change within the context of economic globalization, *Global Environmental Change* 10, 221-232.

Olsen, S.B. 2003: Frameworks and indicators for assessing progress in integrated coastal management initiatives, *Ocean and Coastal Management* 46, 347–361

Olsen, S.B. 2000: Educating for the governance of coastal ecosystems: the dimensions of the challenge, *Ocean and Coastal Management* 43, 331-341.

Olsen, S. and Christie, P. 2000: What Are We Learning from Tropical Coastal Management Experiences? *Coastal Management* 28, 5-18.

Osthorst, W. and Lange, H. 2007: *Integrated Coastal Zone Management (ICZM) as a Challenge to Spatial Planning: On Vision-Building and Decision-Making, An Empirical Evaluation of Applied Planning in Germany*. artec-paper Nr. 147.

Owens, S., Rayner, T. and Bina, O. 2004: New agendas for appraisal: Reflections on theory, practice and research, *Environment and Planning* 36, 1943-1959.

Palang, H., Mander, Ü. and Naveh, Z. 2000: Holistic landscape ecology in action, *Landscape and Urban Planning* 50, 1-6.

Panayotou, T. 2000: Globalization and Environment. CID Working Paper No. 53.

Partidario, M.R. 2000: Elements of an SEA framework - improving the added-value of SEA, *Environmental Impact Assessment Review* 20, 647-663.

Pauchard, A., Aguayo, M., Pena, E. and Urrutia, R. 2006: Multiple effects of urbanization on the biodiversity of developing countries: The case of a fast-growing metropolitan area (Concepcion, Chile) *Biological Conservation*, 127, 272-281.

Pena, J., Bonet, A., Bellot, J. and Sánchez, J.R. 2005: *Trends and driving factors in land use changes (1956-2000) in Marina Baixa, SE Spain*, ERSA 2005 Amsterdam 45th Congress of the European Regional Science Association.

Petschel-Held G., Lasco R., Bohensky E., Domingoes T., Guhl A., Lundberg J. and Zurek M. 2006: Drivers of Ecosystem Change. in *Ecosystems and Human Well-Being Volume 4: Multi-scale Assessments*. Island Press, Washington D.C.

Pérez-Maqueo, O., Intralawan, A. and Martínez, M.L., 2007. Coastal disasters from the perspective of ecological economics, *Ecological Economics* 63, 273-284.

Perry, A. 2000: Impacts of climate change on tourism in the Mediterranean: Adaptive response, *Nota di Lavoro* 35, 2-11.

Peterson, G. 2000: Political ecology and ecological resilience: An integration of human and ecological dynamics, *Ecological Economics* 35, 323-336.

Phillip, M.R and Jones, A.L. 2006: Erosion and tourism infrastructure in the coastal zone: Problems, consequences and management, *Tourism Management* 27, 517-524.

Phinn, S.R., Menges, C., Hill, G.J.E. and Stanford, M. 2000: Optimizing remotely sensed solutions for monitoring, modeling and managing coastal environments, *Remote Sensing of Environment* 73, 117-132.

Pingali, R., Watson, and M. Zurek, M. 2006: Anthropogenic drivers of ecosystem change: an overview, *Ecology and Society* 11.  
<http://www.ecologyandsociety.org/vol11/iss2/art29/>, accessed 5 April 2007.

Pleurom, A. 2007: The Global golf war is flaming up again: A commentary, Tourism Investigation and Monitoring Team (tim-team).

Policy Coordination and Advisory Services, 2004: *Harmonizing and Aligning: The National Spatial Development Perspective, Provincial Growth and Development Strategies and Municipal Integrated Development Plans Policy*, Coordination and Advisory Services, The Presidency, South Africa.

Potschin, M. and Haines-Young, R. 2006: 'Rio+10', sustainability science and landscape ecology, *Landscape and Urban Planning* 75, 162-174.

Reid, A. 2004: *Strategic environmental assessment*, Spice briefing.

Retief, F., Jones, C. and Jay, S. 2007: The status and extent of strategic environmental assessment (SEA) practice in South Africa, *South African Geographical Journal* 89, 44-55.

Ritchie, J. and Lewis, J. (2003) (Eds.). *Qualitative research practice: A guide for social science students and researchers*, London, Sage Publications.

Rocheleau, D.E. 2008: Political ecology in the key of policy: From chains of explanation to webs of relation, *Geoforum* 39, 716-727.

Rodríguez, I., Montoya, I., Sánchez, M.J. and Carreno, F. 2009: Geographic Information Systems applied to Integrated Coastal Zone Management, *Geomorphology*, 107, 100-105.

Rouget, M., Reyers, B., Jonas, Z., Desmet, P., Driver, A., Maze., K., Egoh, B. and Cowling, R.M. 2004. *South African National Spatial Biodiversity Assessment 2004: Technical Report. Volume: Terrestrial Component*. Pretoria: South African National Biodiversity Institute.

Roussouw, N. and Retief, F. 2005: Strategic environmental assessment and planning in South Africa, In: Jones, C., Baker, M., Carter, J., Jay, S., Short, M. and Wood, C. (eds), *Strategic Environmental Assessment and land use planning: an international evaluation*, 188-205. Earthscan, London.

Rutherford, M.C., Mucina, L. and Powrie, L.W. 2006, in Mucina, L. and Rutherford, M.C. (eds) 2006: *The vegetation of South Africa, Lesotho and Swaziland*. Strelitzia19. South African National Biodiversity Institute, Pretoria.

Sárda, R., Avila, C. and Mora, J. 2005: A methodological approach to be used in integrated coastal zone management processes: The case of the Catalan Coast (Catalonia, Spain), *Estuarine Coastal and Shelf Science* 62, 427–439.

Sasidharana, V., Sirakayab, E. and Kerstettera, D. 2002: Developing countries and tourism eco-labels, *Tourism Management* 23, 161–174.

Seymour, J., Stolk, M. and Kohler, K. 2009: *A developer's guide to investing in tourism projects in KwaZulu-Natal*, Tourism KwaZulu-Natal.

Sheate, W., Dagg, S., Richardson, J., Aschemann, R., Palerm, J. and Steen, U. 2001: SEA and Integration of the Environment into Strategic Decision-Making, Final Report Volume 1, CEC Contract No. B4-3040/99/136634/MAR/B4, United Kingdom.

Shi, C., Hutchinson, S.M., Yu, L. and Xu, S. 2001: Towards a sustainable coast: An Integrated Coastal Zone Management Framework for Shanghai, People's Republic of China., *Ocean and Coastal Management* 44, 411-427.

Shi, H. and Singh, A. 2003: Status and interconnections of selected environmental issues in the Global Coastal Zones, *Ambio* 32, 145-152.

Shipman, B. and Stojanovic, T. 2007: Facts, fictions, and failures of Integrated Coastal Zone Management in Europe, *Coastal Management* 35, 375–398.

Simon, F.J.G., Narangajavana, Y. and Marquesa, D.P. 2004: Carrying capacity in the tourism industry: A case study of Hengistbury Head, *Tourism Management* 25, 275–283.

Simonsson, L. 2001: *Applied Landscape Assessment in a Holistic Perspective: A case study from Babati District, north-central Tanzania*. Report No. 1, Environmental Assessment and Development.

SiVEST, 2007: *Strategic Environmental Assessment (SEA): Status Quo Report*, KwaDukuza Municipality.

Solé, R.V., Alonso, D. and Saldaña, J. 2004: Habitat fragmentation and biodiversity collapse in neutral communities, *Ecological Complexity* 1, 65–75

Soliva, R. and Hunziker, M. 2009: Beyond the visual dimension: Using ideal type narratives to analyse people's assessments of landscape scenarios, *Land Use Policy* 26: 284-294.

Sonak, S. and Shaw, R. 2006: Integrating human security concerns in ICZM: An emerging challenge, In Krishnamurthy, R. (Eds) *Integrated Coastal Zone Management (ICZM): The Global Challenge*, Chennai, Research Publishing.

South African Tourism (SAT), 2004: *Global Competitiveness Study Project*, Integrated Presentation Department of Environmental Affairs and Tourism and Department of Trade and Industry, June 2004.

South West Ecological Surveys, Levett-Therivel sustainability consultants and Oxford Brookes University, 2004: *Strategic Environmental Assessment and Biodiversity: Guidance for Practitioners*, Countryside Council for Wales, English Nature, Environment Agency and Royal Society for the Protection of Birds.

Southworth, J., Munroe, D. and Nagendra, H. 2004: Land cover change and landscape fragmentation-comparing the utility of continuous and discrete analyses for a western Honduras region, *Agriculture, Ecosystems and Environment* 101, 185–205.

Sowman, M.R. 1993: The status of coastal management in South Africa, *Coastal Management* 21, 163-184.

Spenceley, A. 2003: Tourism, local livelihoods and the private sector in South Africa: case studies on the growing role of the private sector in natural resources management. *Sustainable Livelihoods in Southern Africa Research Paper 8*, Institute of Development Studies, Brighton.

Steiniger, S. and Hay, G. 2009: Free and open source geographic information tools for landscape ecology, *Ecological Informatics* 4, 183-194.

Stinchcombe, K. and Gibson, R.B. 2001: SEA as a means of pursuing sustainability: ten advantages and ten challenges, *Journal of Environmental Assessment Policy and Management* 3, 343–372.

Stojanovic, T.A. and Ballinger, R.C. 2009: Integrated Coastal Management: A comparative analysis of four UK initiatives, *Applied Geography* 29, 49–62

Stojanovic, T., Ballinger, R.C. and Lalwani, C.S. 2004: Successful integrated coastal management: Measuring it with research and contributing to wise practice, *Ocean and Coastal Management* 47, 273-298.

Strategic Environmental Focus, 2006: Draft *Ecological Assessment for the Sibaya Precinct KwaZulu-Natal* Strategic Environmental Focus, Pty (Ltd).

Tanser, F. and Palmer, A.R. 2000: Vegetation mapping of the Great Fish River basin, South Africa: Integrating spatial and multi-spectral remote sensing techniques, *Applied Vegetation Science* 3, 197-204.

Tarr, P. 2003: SEA in South Africa. Paper presented at the South African Institute for Environmental Assessment Conference, Windhoek.

Taussik, J. 2007: The opportunities of spatial planning for integrated coastal management, *Marine Policy* 31, 611-618.

Tissier, M.L and Hills, J.M. 2006: Widening coastal managers' perceptions of stakeholders through capacity building, In Hoanh, C.T., Tuong, T.P., Gowing, J.W and Hardy, B. (Eds.) 2006: *Environment and Livelihoods in Tropical Coastal Zones* CAB International.

TKZN, 2003: *Strategic environmental assessment for tourism*, Occasional Paper No. 9, 1-4.

TKZN, 2005a: *Coastal Development or Coastal Destruction? The Transformation of the KwaZulu-Natal Coast*, Occasional Paper No. 38, 1-5.

TKZN, 2005b: *The Potential of Golf Tourism in KwaZulu-Natal*, Occasional Paper No. 31,

TKZN, 2007: *The value of KZN's wild places*, Occasional Paper No. 54, 1-8.

TKZN, 2008: *Domestic and Foreign tourist statistics for KwaZulu-Natal*, Draft, Tourism KwaZulu-Natal.

Torell, E. 2000: Adaptation and learning in coastal management: the experience of five East African initiatives, *Coastal Management* 28, 353-363.

Tourism Intelligence International, 2009: Impact of the global recession on travel and tourism-likely scenarios and future strategies.

Treweek, J.R., Hankard, P., Roy, D.B., Arnold, H. and Thompson, S. 1998: Scope for strategic ecological assessment of trunk-road development in England with respect to potential impacts on lowland heathland, the Dartford warbler (*Sylvia undata*) and the sand lizard (*Lacerta agilis*), *Journal of Environmental Management* 53, 147-163.

Trujillo, A.J., Pino, J., Breton, F. 2003. The Role of Coastal Zone Information Systems in a Socio-Environmental Change Study within a Spatio-Temporal and Interdisciplinary Approach: a case study of the Catalonian Coastal Zone, *Integrating Information in Coastal Zone Management-Fifth International Symposium on GIS and Computer Cartography for Coastal Zone Management*, 16<sup>th</sup> - 18<sup>th</sup> October, Palazzo Ducale, Genova, Italy.

Turner, K. 2004: Integrated environmental assessment and coastal futures, In (Eds.) Vermaat, J., Bouwer, L., Turner, K., Salomons, W. 2005: *Managing European coasts: Past, present and future* New York, Springer.

- Turner, M.G. 1989: Landscape ecology: the effects of pattern on process, *Annual Review of Ecology and Systematics* 20, 171-197.
- Turner, M.G. 2005: Landscape ecology: what is the state of the Science? *Annual Review Ecology, Evolution, and Systematics* 319-344.
- Turner, R.K. 2000: Integrating natural and socio-economic science in coastal management, *Journal of Marine Systems* 25, 447-460.
- Turner, R.K. 2004: Integrated environmental assessment and coastal futures, In Vermaat *et al.* (2004) *Managing European coasts: Past, present and future* New York: Springer.
- Turner, R.K., Paavola, J., Cooper, P., Farber, S., Jessamy, V. and Georgiou, S. 2003: Valuing nature: lessons learned and future research directions, *Ecological Economics* 46, 493-510.
- Turner, R.K., Subak, S.E. and Adger, W.N.1995: *Pressures, trends and impacts in the coastal zones: Interactions between socio-economic and natural systems*. Center for Social and Economic Research on the Global Environment Working Paper GEC 95-09.
- Turpie, J.K. 2004. *South African National Spatial Biodiversity Assessment 2004: Technical Report. Volume 3: Estuary Component*. Pretoria, South African National Biodiversity Institute.
- Tzatzanis, M., Wrabka, T. and Sauberer, N. 2003: Landscape and vegetation responses to human impact in sandy coasts of Western Crete, Greece, *Journal for Nature Conservation* 11, 187-195.
- UNDP, 2006: *Country Programs and Related Matters*, Draft country program document for South Africa (2007-2010), New York Second regular session New York.
- UNEP, 1995: Global Program of Action for the Protection of the Marine Environment from Land-based Activities. Washington, D.C.
- UNEP, 2001a: *Good Practices Guidelines for Integrated Coastal Area Management in the Mediterranean*. Split, Priority Actions Program.
- UNEP, 2001b: White Paper: Coastal Zone Management in the Mediterranean. Split, Priority Actions Program.
- UNESCO, 2006: *Meeting the Commitments on Oceans, Coasts, and Small Island Developing States Made at the 2002 World Summit on Sustainable Development: How Well Are We Doing?* Third Global Conference on Oceans, Coasts, and Islands: Moving the Global Oceans Agenda Forward, UNESCO, Paris.

United Nations Division for Sustainable Development, 2005: Plan of Implementation of the World Summit on Sustainable Development.

<http://www.un.org/esa/sustdev/documents/WSSD>, accessed 5 May 2008.

United Nations, 1992: *Agenda 21: The United Nations Program of Action from Rio*. United Nations, New York, USA. [H:\Agenda 21 - Chapter 17 Protection of the Oceans.mht](#), accessed 20 June 2009.

United States Agency for International Development (USAID), 2007: Coastal community resilience: A guide for planning and action to address Tsunami and other coastal hazards, US Indian Ocean Tsunami Warning System (IOTWS) Program, Bangkok.

United States Agency for International Development (USAID), 2008: Coastal Community Resilience: A Guide for Planning and Action to Address Tsunami and Other Coastal Hazards, US Indian Ocean Tsunami Warning System (IOTWS) Program, Bangkok.

United States Geological Survey (USGS), 2009: [http://glovis.usgs.gov/ImgViewer/Java2ImgViewer.html?limitMissions=FALSE&mission=LANDSAT\\_ARCHIVE&sensor=SLCOFF&lat=-26.3&lon=32.3](http://glovis.usgs.gov/ImgViewer/Java2ImgViewer.html?limitMissions=FALSE&mission=LANDSAT_ARCHIVE&sensor=SLCOFF&lat=-26.3&lon=32.3), accessed 24 June 2009.

van den Bergh, J.C.J.M. 2000: *Ecological Economics: Themes, Approaches, and Differences with Environmental Economics*, Department of Spatial Economics. Free University, Netherlands.

van der Knaap, W and Ivanov, E. 2005: Integrated environmental planning in European coastal regions. <http://aesop2005.scix.net/data/papers/att/272.fullTextPrint.pdf>, accessed 5 June 2008.

Van der Wateren, T., Diederichs, N., Mander, M., Markewicz, T. and O'Connor, T. 2006: *Mhlathuze Strategic Catchment Assessment, Richard bay, South Africa*, Case study compiled for the drafting of CBD guidelines on Biodiversity in SEA.

Vanderhaegen, M. and Muro, E. 2005: Contribution of a European spatial data infrastructure to the effectiveness of EIA and SEA studies, *Environmental Impact Assessment Review* 25, 123-142.

Vázquez, J.F. 2003: A methodology for policy analysis in water resources management, *Resources and Environmental Economics*, Italy.

Vergano, L. and Nunes, P.A.L.D. 2006: *Analysis and Evaluation of Ecosystem Resilience: An Economic Perspective*, (SIEV) Sustainability Indicators and Environmental Valuation.

Verhagen, H.J. 1998: *Policy Analysis Methodology* EAPD, Varna 21-24 September, 1998.

Vitousek, P.M., Mooney, H.A., Lubchenco, J. and Melillo, J.M. 1997: Human Domination of Earth's Ecosystems, *Science* 277, 494-499.

VKE Consulting Engineers, 2005: *Preliminary Assessment for Stormwater Catchment Plan Vela* VKE Consulting Engineers, Draft Hawaan Scoping Report.

Vordzorgbe, S.D. 2007: Climate change and risk management in Africa: Major issues, United Nations International Strategy for Disaster Reduction (UN/ISDR), Expert Background Paper for the Session on Risk Management and Climate Change, World Economic Forum on Africa, Cape Town, 13 – 15 June.

Vrancken, P.H.G. 2009: *Aspects of the legal environment of coastal and marine tourism in South Africa*, Proceeding of the Sixth International Congress on Coastal and Marine Tourism, 23-26 June 2009, Nelson Mandela Bay, South Africa.

Warnken, J., Bradley, M. and Guilding, C. 2005: Eco-resorts vs. mainstream accommodation providers: an investigation of the viability of benchmarking environmental performance, *Tourism Management* 26, 367–379.

Weng, Q. 2002: Land use change analysis in the Zhujiang Delta of China using satellite remote sensing, GIS and stochastic modeling, *Journal of Environmental Management* 64, 273–284.

Wheeldon, J. and Faubert, J. 2009: Framing Experience: Concept Maps, Mind Maps, and Data Collection in Qualitative Research, *International Journal of Qualitative Methods* 8, 69-83.

White, R.M., Fischer, A., Marshall, K., Travis, J.M.J., Webb, T.J., di Falco, S., Redpath, S.M. and van der Wal, R. 2009: Developing an integrated conceptual framework to understand biodiversity conflicts, *Land Use Policy* 26, 242-253.

Wiethuchter, A. 2008: *Assessment of Ecosystem Goods and Services provided by the Coastal Zone System Limfjord*, Science Policy Interface for Coastal Systems Assessment (SPICOSA), Limfjorden, Denmark.

Wilkinson, P., 2002: *Integrated planning at the local level? The problematic intersection of integrated development planning and integrated transport planning in contemporary South Africa*, Regenerating Africa through Planning, International Convention Center, Durban, 18-20 September 2002.

Wilson, M.A. and Howarth, R.B. 2002: Discourse-based valuation of ecosystem services: establishing fair outcomes through group deliberation, *Ecological Economics* 41, 431–443.

Woodroffe, C.D. 2002: *Coasts: Form, processes and evolution*. Cambridge University Press, United Kingdom.

Wu, J. and Hobbs, R. 2002: Key issues and research priorities in landscape ecology: An idiosyncratic synthesis, *Landscape Ecology* 17, 355-365.

WWF, 2008: *Living planet report*. WWF International, Switzerland.

Xiuwan, C. 2002: Using remote sensing and GIS to analyze land cover change and its impacts on regional sustainable development, *International Journal of Remote Sensing* 23, 107–124.

Xiuzhen, C., Jincheng, S. and Jinhua, W. 2002: Strategic Environmental Assessment and its development in China, *Environmental Impact Assessment Review* 22, 101–109.

Xue, X., Hong, H. and Charles, A.T. 2004: Cumulative environmental impacts and integrated coastal management: The case of Xiamen, China, *Journal of Environmental Management* 71, 271-283.

Yepes, V. and Medina, J.R. 2005: Land Use Tourism Models in Spanish Coastal Areas. A Case Study of the Valencia Region, *Journal of Coastal Research* Special Issue 49, 83-88.

Zagonari, F. 2008: Integrated coastal management: Top-down vs. community-based approaches, *Journal of Environmental Management* 88, 796-804.

# Appendices

## **APPENDIX I:**

### **Standardized South African land use/cover classification system and associated description (Source: CSIR, 2001)**

#### **1. Forest and woodland**

All wooded areas with greater than 10% tree canopy cover, where the canopy is composed of mainly self-supporting, single stemmed, woody plants >5 m in height. Essentially indigenous tree species, growing under natural or semi-natural conditions (although it may include some localized areas of self-seeded exotic species). Excludes planted forests (and woodlots). Typically associated with the Forest and Savanna biomes in South Africa.

##### **Forest**

Tree canopy >70%. A multi-strata community, with interlocking canopies, composed of canopy, sub-canopy, shrub and herb layers.

##### **Woodland**

Tree canopy cover between 40-70%. A closed-to-open canopy community, typically consisting of a single tree canopy layer and a herb (grass) layer.

##### **Wooded Grassland**

Tree canopy cover between 10-40%. An open-to-sparse canopy community, typically consisting of a single tree canopy layer and a herb (grass) layer.

#### **2. Thicket, bushland, scrub forest and High Fynbos**

Communities typically composed of tall woody, self-supporting, single and/or multi-stemmed plants (branching at or near the ground), with, in most cases no clearly definable structure. Total canopy cover >10% height canopy height between 2-5 m. essentially indigenous species, growing under natural or semi-natural conditions

(although it may include some localized areas of self-seeded exotic species, especially along riparian zones). Typical examples are Valley Bushveld, Mopane bush, and tall Fynbos. Dense bush encroachment areas would be included in this category.

### **Thicket**

Areas of densely interlaced trees and shrub species (often forming an impenetrable community). Composed of multi-stemmed plants with no clearly definable structure or layers, with >70% cover. A typical example would be Valley Bushveld.

### **Scrub Forest**

Vegetation intermediate in structure between true forest and thicket. A multi-layered community with interlocking canopies, with >70% cover.

### **Bushland**

Similar to “thicket”, but more open in terms of canopy cover levels. Composed of multi-stemmed plants with no definable structure or layers, and with <70% cover.

### **Bush clumps**

Scattered islands of thicket-like vegetation (i.e. > 70% cover) with a matrix of more open Bushland or grassland.

### **High Fynbos (Heathland)**

Fynbos communities between 2-5 m in height, >70% cover, and composed of multi-stemmed evergreen bushes typically growing on fertile soils. The *Proteaceae* family typically dominates.

### **3. Shrubland and Low Fynbos**

Communities dominated by low, woody, self-supporting, multi-stemmed plants branching at or near the ground, between 0.2-2 m in height. Total tree cover <1.0%. Low shrublands and heathlands are combined at Level I due to similar overall

physiognomic structure and (in most cases) appearance on remotely sensed imagery. Examples would include low Fynbos, Karoo and Lesotho (alpine) communities.

### **Shrubland**

Typically broad-leaved or bushes, frequently deciduous. A typical example would be vegetation from the Karoo biomes. Category also includes dwarf succulent shrublands.

### **Low Fynbos (Heathland)**

Typically small-leaved (i.e. *nanophyllous*), *sclerphyllous*, evergreen plants growing on infertile soils. *Proteaceae*, *Ericaceae* and *Restionaceae* frequently dominate.

## **4. Herbland**

Communities dominated by low, non-woody, self-supporting, non-grass like plants, between 0.2-2 m in height. Total tree cover <1.0%. Typical vegetation examples are found in Namaqualand, and 'weed' dominated degraded areas.

## **5. Grassland**

All areas of grassland with less than 10% tree and/or shrub canopy cover, and greater than 0.1% total vegetation cover. Typically associated with the Grassland biome.

### **Unimproved Grassland**

Essentially indigenous species, growing under natural or semi-natural conditions.

### **Improved Grassland**

Planted grassland, containing either indigenous or exotic species, growing under managed conditions for grazing, hay or turf production, recreation (e.g. golf courses).

## **6. Forest plantations**

All areas of systematically planted, man-managed tree resources, composed of primarily exotic species (including hybrids). Category includes both young and

mature plantations that have been established for commercial timber production, seedling trails, and woodlots/windbreaks of sufficient size to be identified on satellite imagery. Unless otherwise stated, Levels 1 and 2 include clear-felled stands with plantations. Excludes all non-timber based plantations such as tea and sisal, as well as orchards used in the production of citrus or nut crops. Level 1 category will include associated land cover/use's such as roads, fire-breaks and building infrastructure if these are too small to be clearly mapped off the satellite imagery.

### **7. Water bodies**

Areas of (generally permanent) open water. The category includes natural and man-made Water bodies, which are either static or flowing, and fresh, brackish and salt water conditions. This category includes features such as rivers, dams (reservoirs), permanent pans, lakes, lagoons and coastal waters.

### **8. Wetlands**

Natural or artificial areas where the water levels is at (or very near the land surface) on a permanent or temporary basis, typically covered in either herbaceous or woody vegetation cover. The category includes fresh, brackish and salt water conditions. Examples include salt marsh, pans (with non-permanent water cover), reed-marsh or papyrus-swamp and peat bogs.

### **9. Barren Lands**

Non-vegetated areas, or areas of very little vegetation cover (excluding agricultural fields with no crop cover, and opencast mines and quarries), where the substrate or soil exposure is clearly apparent.

### **Bare Rock/soil**

Natural areas of exposed sand, soil or rock with no, or very little vegetation cover during ant time of the year, including rocky outcrops, dunes and gravel plains.

### **Degraded land**

Permanent or seasonal, man-induced areas of very low vegetation cover (i.e. removal of tree, bush and/or herbaceous cover) in comparison to the surrounding natural vegetation cover. Category includes major erosion scars (sheet or gully erosion). Should be sub-divided by Level1 vegetation classes, i.e. Degraded-woodland and degraded grassland wherever possible to allow reconstruction of full class extent. Typically associated with subsistence level farming and rural population centers, where overgrazing of livestock and/or wood resources has been excessive. Often associated with severe soil erosion problems.

### **10. Cultivated land**

Areas of land that are ploughed and/or prepared for raising crops (excluding timber production). The category includes areas currently under crop, fallow land), and land being prepared for planting. Unless mapping scales allow otherwise, physical class boundaries are broadly defined to encompass the main areas of agricultural activity, and are not defined on exact field boundaries. As such the class may include small inter-field cover types (hedges, grass strips, small windbreaks), as well as farm infrastructure, subdivided into:

- (a) Subsistence/semi-commercial cultivation: characterized by numerous small field units in close proximity to rural population centers. Typically dryland crops produced for individual or local (village) markets. Low level of mechanization.
- (b) Commercial cultivation: characterized by large, uniform, well managed field units, with the aim of supplying both regional, national and export markets. Often highly mechanized.
- (c) Irrigated/non-irrigated: Major irrigation schemes (areas supplied with water for agricultural purposes by means of pipes, overhead sprinklers, ditches or streams), are characterized by numerous small farm-scale irrigation dams, close proximity to major water sources and/or center pivot irrigation systems.

**Permanent crops**

Lands cultivated with crops that occupy the area for long periods and are not replanted after harvest. Examples would include tea plantations, vineyards, sugarcane and citrus orchards, hops and nuts.

**Temporary crops**

Land under temporary crops (annuals) that are harvested at the completion of the growing season, that remains idle until replanted. Examples would be maize, wheat, legumes, and Lucerne. Lands cultivated with crops that occupy the area for long periods and are not replanted after harvest. Examples would include tea plantations, vineyards and citrus orchards.

**11. Urban/built-up land**

An area where there is permanent concentration of people, buildings, and other man-made structures and activities, from large village to city scale. Small rural communities are often included within the surrounding land cover category (subsistence/semi-commercial agriculture) if mapping scales do not permit identification of such settlements as individual feature. Where mapping scales permit, the limits of the urban boundary are delineated to exclude open areas within the built-up regions (vegetated or non-vegetated areas with few or no structures).

**Residential area**

Areas in which people reside on a permanent or non-permanent basis. The category includes both formal (permanent structures) and informal (no permanent structures) settlement areas, ranging from high to low building densities, (including smallholdings on the urban fringe).

**Commercial**

Non-residential area used primarily for the conduct of commerce and other mercantile business, typically located in the central business district (CBD).

## APPENDIX II

### Focus Group Schedule: Interested and Affected Parties (I&APs )

University of KwaZulu-Natal, Howard College

School of Environmental Science

Workshop: Land use, ecology, tourism and policy on the KwaZulu-  
Natal north coast



### INTRODUCTION

Welcome and thank you for coming to this focus group discussion. My name is Fathima Ahmed and I am from the School of Environmental Sciences, University of KwaZulu-Natal. The aim of this exercise is to inform my PHD research, entitled: The use of Spatial Analysis in Strategic Environmental Assessment (SEA), to Identify & Predict the Ecological Impacts of Development on the KwaZulu – Natal North Coast.

For the next two to three hours, the group will talk about topics including land use, ecology, institutional and legislative aspects and tourism along the geographic context of the KwaZulu-Natal north coast

#### Ground Rules:

- Your participation is voluntary and there is no penalty for refusing to participate
- All information shared here is confidential
- Please feel free to speak openly.
- With your permission, we would like to take down notes during our session because we don't want to miss any of your comments. We assure you that all

notes taken will only be used for research purposes. They will be kept in a secure location that is only accessible to project staff.

*Does anyone have any questions?*

If you think of any questions in the future, feel free to contact the Primary Investigator:

Fathima Ahmed

Discipline of Geography

School of Environmental Sciences

University of KwaZulu-Natal

Tel: 031 260 3523

Email: [Ahmedf1@ukzn.ac.za](mailto:Ahmedf1@ukzn.ac.za)

Do you agree to participate in the discussion?

Group introduction: Let us get to know each other. Could each person please state their name, organisation and briefly their field of expertise.

### Section 1: Mapping Key Ecosystems (State-pressure-response) (1hour)

In addressing this question, we will engage in several map-drawing exercises of the ecosystems present in the study area, their state and pressures/drivers of change impacting on them. Apart from mapping, may we please also have a general discussion regarding why and list applicable policy to the particular issues raised, including local legislation.

*Mapping the following:*

- 1.1. Key land use & key land cover classes
- 1.2. Key ecosystems & threats (natural and developmental)
- 1.3. Key endemic plant and animal species distributed in the landscape ie. ‘hotspots’, and movement corridors)
- 1.4. Resilient and vulnerable areas
- 1.5. Likely future map of threats/pressures

## Section 2: Development (Land Use) (1hr)

- 2.1 Who or what are the key drivers of change? (Ranking matrix)
- 2.2 What are the key social, economic and environmental impacts of developmental change in the area? Provide examples where possible. *(NB: impacts are not necessarily negative)*
- 2.3 What are the current tools/ strategies to manage development in the area? Are they effective? Are you satisfied with current approaches? If not, explain and provide alternatives, if possible?
- 2.4 What (if any) are the problems specifically in relation to areas of implementation and enforcement of environmental assessments?
- 2.5 Where do you see future pressure points or development 'hotspots' (transit routes, higher density development)?
- 2.6 Have there been any conflicts relating to land use and development in the area? If so, what were these and how were they managed/ resolved?

## Section 3: Institutional (1hour)

- 3.1 Who are the major decision-makers in the area, and what are their levels of influence? (in terms of managing/ influencing development) [Venn diagram]
- 3.2 What are the major institutional barriers in management of the coastline?
- 3.3 What resources are needed in order to address these barriers effectively?

## Section 4: Policy (Coastal Management Plans & strategic Plans) (45minutes)

- 4.1 What local or regional strategies/plans/action plans does your council and/ or other stakeholders currently use to make decisions and take action in relation to the coast?
- 4.2 Are there specific CZM plans in the area? If so, what are these? (do they draw links with other policy/how are boundaries identified)?
- 4.3 Would you like to see an SEA for the area? Why?
- 4.4 What are the constraints to undertaking SEA by Municipalities (bearing in mind that it is not legislated)?

- 4.5 Which are the plans/programmes which are prepared for land use and which set the framework for the future development context of projects?
- 4.6 Are you familiar with the current Integrated Coastal Management Act (ICMA)? If so, what do you think are the strengths and weaknesses of the Act?

Section 5: Tourism Development (45min)

- 5.1 What are the current trends in tourism in the study area?
- 5.2 What are the main tourism products/ demands in the area?
- 5.3 What are the particular/specific positive and negative issues relating to tourism in the area (socio-economic and environmental), specifically in relation to coastal aspects?
- 5.4 Indicate key constraints on tourist organization's ability to adequately address the issues and impacts associated with tourism in their localities.
- 5.5 Are there any written policy or strategic plan that relates specifically to tourism in the area? If so, provide details. Have the written tourism policies or strategic plans been formulated in such a way so as to both facilitate tourism development, and to manage or mitigate tourism's negative impacts?
- 5.6 Are tourism-specific policies/plans coordinated with/complimentary to, broader tourism strategies at the inter-regional levels?
- 5.7 Do you think tourism should increase in the area? If so, what type/s and how should this be managed?

***Thank you for participating in this workshop.***

## APPENDIX III

### Focus Group Schedule: Academia

University of KwaZulu-Natal, Howard College  
School of Environmental Science



#### Workshop: Criteria for policy and institutional analysis in the coastal zone

#### INTRODUCTION

Welcome and thank you for coming to this focus group discussion. My name is Fathima Ahmed and I am from the School of Environmental Sciences, University of KwaZulu-Natal. The aim of this exercise is to inform my PHD research, entitled: The use of Spatial Analysis in Strategic Environmental Assessment (SEA), to Identify & Predict the Ecological Impacts of Development on the KwaZulu – Natal North Coast.

For the next two to three hours, the group will talk about topics including the definition of the coastal zone, the components of the coastal zone, the criteria that is required to improve institutional and policy aspects pertaining to how the coast is managed.

#### *Ground Rules:*

- Your participation is voluntary and there is no penalty for refusing to participate
- All information shared here is confidential
- Please feel free to speak openly.
- With your permission, we would like to take down notes during our session because we don't want to miss any of your comments. We assure you that all notes taken will only be used for research purposes. They will be kept in a secure location that is only accessible to project staff.

*Does anyone have any questions?*

If you think of any questions in the future, feel free to contact the Primary Investigator:

Fathima Ahmed

Discipline of Geography

School of Environmental Sciences

University of KwaZulu-Natal

Tel: 031 260 3523

Email: [Ahmedf1@ukzn.ac.za](mailto:Ahmedf1@ukzn.ac.za)

Do you agree to participate in the discussion?

Group introduction: Let us get to know each other. Could each person please state their name, organization and briefly their field of expertise.

### **Section 1: Definition/s of the coastal zone (1hour)**

- 1.1 How would you define the coastal zone? Why/do you think that defining a coastal zone is important? Please explain.
- 1.2 Are you aware of any changes to the perspectives on the definitions of the coastal zone? If so what do you think influenced these changes? (Consider the term 'Integrated coastal zone management').
- 1.3 Has there been any significant event/coastal zone problem in the last 3 years that has made you look at the coastal zone as a sensitive area? Elaborate.
- 1.4 What are the most significant changes that have occurred on this coastline that you have witnessed in the last five years (generally).
- 1.5 Have these been largely positive/largely negative? Explain.

### **Section 2: Criteria for institutional strength in coastal zone management (1 hour)**

- 2.1 What, in your opinion, is the definition of an institution?
- 2.2 Are you aware of/which would you think are the institutions involved in managing the coast?
- 2.3. Without discussing the specifics (any specific duties of an institution), what do you think are important criteria for institutional strength in the coastal zone? Ranking matrix

2.3 Who do you think are important compliments (actors/organizations) to institutional strength in the coastal zone/managing the environment in general? Please explain.

**Section 3: Policy review (1 hour)**

3.1 Are you aware of any relevant legislation concerning the management of the Coastal Zone in your area? Why do you think this is important?

3.2 What are the important criteria that you feel should be included in the performance management of a policy? Select and explain approximately 5-10 criteria.

3.3 In relation to section 2 above, how do you think policy and institutions ought to relate?

*Thank you for participating.*

## APPENDIX IV

### Key Stakeholder Interview: Coastal Management

University of KwaZulu-Natal, Howard College

School of Environmental Science

#### Doctoral Research



**Topic:** *The use of Spatial Analysis in Strategic Environmental Assessment (SEA), to Identify & Predict the Ecological Impacts of Development on the KwaZulu – Natal North Coast of South Africa*

**Researcher:** Fathima Ahmed

*(All respondents and responses will remain anonymous and the information will be used strictly for research purposes)*

---

Name of Institution

Respondent's Position

#### 1. Coastal land use

1. 1 Who or what are the key drivers of land use change?

1. 2 What are the key social, economic and environmental impacts of developmental change in the area?

1.3 What are the current tools/ strategies to manage development in the area? Are they effective? If not, explain and provide alternatives, if possible?

1. 4 What (if any) are the problems specifically in relation to areas of implementation and enforcement of environmental assessments?

---

1.5 Where do you see future pressure points or development ‘hotspots’ (transit routes, higher density development)?

1.6 Have there been any major conflicts relating to land use and development in the area?

If so, what were these and how were they managed/ resolved?

1.7 Which are the plans/programs which are prepared for land use and which set the framework for the future development context of projects?

## **2. Institutional**

2. Who are the major decision-makers in the area, and what are their levels of influence? (in terms of managing/ influencing development)?

2.2 What are the major barriers you experience in dealing with institutional/decision-making?

2.3 What are your specific needs in order to address these barriers effectively?

2.4 In what way would you like to see your Council involved? (Please mark appropriate box)

A. As individual councils?

B. As regional groupings of Councils?

C. As a State grouping of Councils?

D. All of the above, depending on the issue and its impacts

What processes would you like to see implemented to achieve this? Please comment.

## **3. POLICIES AND LAWS**

3.1 What local or regional strategies/plans/action plans does your council currently use to make decisions and take action in relation to the coast?

3.2 Would you like to see an SEA for the area? Why?

3.3 What are the constraints to undertaking SEA by Municipalities (bearing in mind that it is not legislated)?

3.4 Can you name or describe approaches or examples of “good practice“ concerning the integration of SEA into urban planning?

---

*Thank you for participating in this project.*

## APPENDIX V

### Key Stakeholder Interview: Tourism stakeholders

University of KwaZulu-Natal, Howard College  
School of Environmental Science



#### Doctoral Research

**Topic:** *The use of Spatial Analysis in Strategic Environmental Assessment (SEA), to Identify & Predict the Ecological Impacts of Development on the KwaZulu – Natal North Coast of South Africa*

**Researcher:** Fathima Ahmed

*(All respondents and responses will remain anonymous and the information will be used strictly for research purposes)*

---

Name of Institution

Respondent's Position

---

#### Tourism trends

1. What are the current trends in tourism in the study area?
2. What are the main tourism products/ demands in the area?

#### Tourism and the environment

3. What are the particular/specific positive and negative issues relating to tourism in the area (socio-economic and environmental), specifically in relation to coastal aspects?
4. Beach tourism has been associated with mass tourism. What are the perceived benefits and negatives of mass tourism?

5. Do you think tourism should increase in the area? If so, what type/s and how should this be managed?

6. Where do you perceive the greatest pressure for development on the coastline? Please discuss. Indicate with a 'x' where you see particular stressors impacting on pressure points (land-use/cover). You may inform and reinforce your responses by referring to questions 3-5 above).

<i>Pressure Points</i>						
	Beach /1 <sup>0</sup> Dune	2 <sup>nd</sup> Dune/Forest	Estuaries	Grassland	Wetlands	Agriculture
Sea level change						
Local erosion						
Construction (tourist)						
Construction (general)						
Pollution (sewage)						
Pollution (litter)						
>tourists						
Urban expansion						

**Policy and institutional aspects**

7. Indicate key constraints on tourist organization’s ability to adequately address the issues and impacts associated with tourism in their localities.

8. Are there any written policy or strategic plan that relates specifically to tourism in the area? If so, provide details.

9. Are tourism-specific policies/plans coordinated with/complimentary to, broader tourism strategies at the inter-regional levels?

*Thank you for participating in this project.*

## APPENDIX VI

### Key Stakeholder Interview: Environmental Stakeholders

University of KwaZulu-Natal, Howard College  
School of Environmental Science

#### Doctoral Research



**Topic:** *The use of Spatial Analysis in Strategic Environmental Assessment (SEA), to Identify & Predict the Ecological Impacts of Development on the KwaZulu – Natal North Coast of South Africa*

**Researcher:** Fathima Ahmed

*(All respondents and responses will remain anonymous and the information will be used strictly for research purposes)*

---

Name of Institution

Respondent's Position

---

#### Key Ecosystems on the coastline

1. In relation to above, what would you say are the general state of these ecosystems? Please mark with an 'X' (Based on IUCN categories). Please list important patterns/processes impacted upon.

	Threatened			Not threatened	Least concern	Pattern/process impacted upon
	Critically endangered	Endangered	Vulnerable			
Coastal forest						
Estuary						
Wetland						
Grassland						
Dune cordon						

2. With regard to the above list of ecosystems, please explain the significance of loss of patterns/processes to each ecosystem?
  
3. Are there any development activities/types in particular that are major threats to biodiversity? What has been the response to these impacts?
  
4. Are there any natural threats to the ecosystems identified in Q 1.1?
  
5. Please discuss how biodiversity or ecosystems support the general socio-economic development in the area.

**Biodiversity links with policy**

6. How would you describe the general links between biodiversity and the spatial development frameworks as required in municipal IDPs? Is there effective integration? If not why do you think this is so?
  
7. How would you describe the general links between biodiversity and the EMFs required in municipal the EIA? Is there effective integration? If not why do you think this is so?

8. Are you in favor of an SEA for the area? Please elaborate. With regard to this question, what are the shortcomings of biodiversity inclusion in EIA with regard to general development in the area?

9. How would you rate the inclusion of biodiversity into national frameworks such as the Accelerated and Shared Growth Initiative (Excellent, fair or poor)? Please explain.

10. How would you rate the inclusion of biodiversity into provincial frameworks such as the KwaZulu-Natal Provincial Economic and Development Strategy? Please explain.

**Decision-making with regard to biodiversity and planning in development activities**

11. Considering the coastline under investigation, who are the people/organizations that have the most influence in environmental decision-making?

12. What are the barriers to effective decision-making with regard to biodiversity in the area under investigation?

13. Are there any recommendations you would like to make regarding the protection of biodiversity?

*Thank you for your participation in this project.*

## APPENDIX VII

### Key Stakeholder Interview: Developers

University of KwaZulu-Natal, Howard College  
School of Environmental Science



#### Doctoral Research

**Topic:** *The use of Spatial Analysis in Strategic Environmental Assessment (SEA), to Identify & Predict the Ecological Impacts of Development on the KwaZulu – Natal North Coast of South Africa*

**Researcher:** Fathima Ahmed

*(All respondents and responses will remain anonymous and the information will be used strictly for research purposes)*

---

Name of Institution (optional)

Respondent's Position

---

#### Type of Development Activity

1. What type of development activity are you/your organisation primarily involved in?

Eco-estates

General residential

Special residential (which)?

Tourist

Other (please specify)

2. What are the particular benefits of developing in this area?

3. Is your development dependant on a coastal location? If not, what factors prompted you to undertake development within this area?
4. What are the key physical attributes in the area that you consider as opportunities for developing on this coastline?
5. What key social and economic attributes do you consider as beneficial to developing on this coastline?
6. Are there any emerging positive and negative environmental impacts that you have witnessed as a result of general development in the area?
7. How can your development activity contribute to preserving the ecology of the area?

#### **Land use on the north coast of KwaZulu-Natal**

8. How do you perceive general land use change and its development impacts along the entirety of this coastline?
9. Where do you see future pressure points or development ‘hotspots’ (transit routes, higher density development, etc)? Please specify location.
10. Would you like to see any changes in land use generally? If so, please elaborate.

#### **Policy and institutional aspects**

11. What are the current tools/ strategies to manage development in the area? Are they effective? Are you satisfied with current approaches? If not, explain and provide alternatives, if possible?

12. What (if any) are the problems specifically in relation to areas of implementation and enforcement of environmental assessments (EIA)?

13. Who are the major decision-makers in the area, and what are their levels of influence? (in terms of managing/ influencing development?). Are there any particular institutional barriers to development in the area?

14. What are the particular policies/legislation that are required before your development is approved? Are you satisfied with these? If not, please elaborate.

15. Would you like to see a Strategic Environmental Assessment (SEA) for the area? Why?

16. Which are the plans/programs which are prepared for land use and which set the framework for the future development context of projects? Does this impact positively/negatively on your development activity? Please elaborate.

17. Can you name or describe approaches or examples of “good practice”, concerning the integration of SEA-type assessment pertaining to your development?

18. Are you familiar with the current Integrated Coastal Management Act (ICMA)? If so, what do you think are the strengths and weaknesses of the Act in terms of coastal development?

19. Are there any comments/recommendations you would like to make regarding general development in the area?

*Thank you for participating in this project.*